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NATIONAL AIR SAMPLING NETWORK PROGRAM MANUAL FOR THE IBM 650 COMPUTER

Arthur C. Stern, et al

Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio

1958

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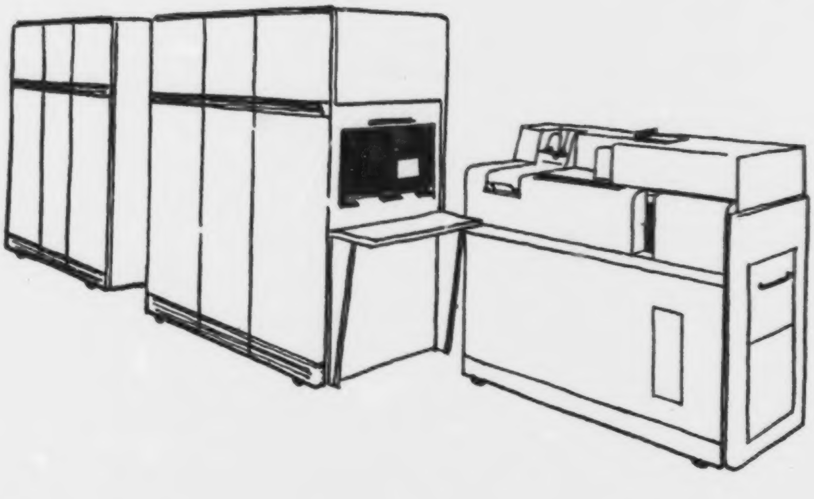

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NATIONAL AIR SAMPLING NETWORK

PROGRAM MANUAL FOR THE IBM 650 COMPUTER

Arthur C. Stern, Chief
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Air Pollution Engineering Research

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

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Cincinnati 26, Ohio

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PURPOSE OF PROGRAM

To analyze data from chemical, physical, or meteorological measurements taken at random time intervals over a period of years at a number of measuring stations. Three forms of tabulation of each measured or computed item of data are prepared; monthly or diurnal compilations (Fig. 1), annual compilations (Fig. 2), and total compilations (Fig. 2).

COMPONENTS OF PROGRAM

The entire National Air Sampling Network Program consists of four interdependent subprograms:

(a) The Initial Run Program
(b) The Table Deck Preparation Program
(c) The National Air Sampling Network Fixed Program
(d) The Alphabetic Identification Card Preparation Program

The National Air Sampling Network Program requires four runs of the 650 Computer. The initial run is a pass of the data card deck which, in addition to identifying data card errors, also punches a single card giving the minimum and maximum values of the data under analysis. The second run uses the minimum and maximum values thus obtained to punch a Table Deck necessary for the third or main computing run. This latter is a pass of the data card deck (with identified errors corrected) to punch the desired analysis of the data. The last run is a pass of the output cards from the main computing run to develop the name of each city, state, and region in alphabetic form. Selection of the analysis desired is made on the first and third runs by appropriate Program Variable Cards.

The Initial Run and Table Deck Preparation Programs will be described as part of the program proper, which follows.

PROGRAM INPUT

The program requires 80-80 board wiring (Fig. 3) and

(a) A Special 7 Instruction per Card Loading Deck
(b) A Fixed Program Deck (7 instructions per card)
(c) A Table Deck (7 instructions per card)
(d) A Program Variable Card Deck (single instruction)
(e) A Data Read Card (00 0000 1545)
(f) Data Card Deck
(g) A Stop Card

FIGURE 1. FORM OF MONTHLY-CITY COMPUTER OUTPUT

Word #1						2				3		4		5		6		7		8	
Monthly or Diurnal City Identification Word						Category Identification Word				Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Region	State	City	Zero	Zero			Zero	Year or Initial Year	Terminal Year	0-2 AM	2-4 AM	4-6 AM	6-8 AM	8-10 AM	10-12 AM	12-2 AM	2-4 PM	4-6 PM	6-8 PM	8-10 PM	10-12 PM
X	XX	XXX	0	0	XX	XXXXX	0	XX	XX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX
1	2-3	4-6	7	8	9-10	11-15 See Fig. 2	16	17-18	19-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-80

11 - Count
22 - Maximum
33 - Average
44 - Minimum

FIGURE 2. FORM OF FREQUENCY DISTRIBUTION COMPUTER OUTPUT

Word #1						Word #2				
	Location and Time Identification					Category Identification				Count
	Region	State	City	Year or Initial Year	Terminal Year	Weekend or Weekday	Population Class	Topographic Class	Substance or Percent Substance	
(Column No.)	1	2-3	4-6	7-8	9-10	11	12	13	14-15	16-20
Annual City	X	XX	XXX	XX	00	X	X	X	XX	XXXXX
City Total	X	XX	XXX	XX	XX	0 - Both	0 - All classes	0 - All Urban	(Do not use 00)	
State Total	X	XX	000	XX	XX	1 - Weekday	1 - 3 Million or more	1 - All Non-Urban	01 - Total Particulate	
Regional Total	X	00	000	XX	XX	2 - Sunday	2 - 1-3 Million	2 - Atlantic Coast	02 - Benzene Soluble	
National Total	0	00	000	XX	XX		3 - 700,000-1,000,000	3 - Desert	03 - Acetone Soluble	
	Region	State	City	Year or Initial Year	Terminal Year		4 - 400,000-700,000	4 - Farmland	etc.	
							5 - 100,000-400,000	5 - Forest		
Annual Site	X	00	XXX	XX	00		6 - 50,000-100,000	6 - Great Lakes Coast		
Site Total	X	00	XXX	XX	XX		7 - 25,000-50,000	7 - Gulf Coast		
							8 - 10,000-25,000	8 - Mountain		
							9 - Under 10,000	9 - Pacific Coast		

	Word #3		Word #4		Word #5		Word #6		Word #7		Word #8	
	Minimum	10%	20%	30%	40%	50%	60%	70%	80%	90%	Maximum	Average
(Column No.)	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-80
	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX	XXXXX

All the above are punched as load cards and have signs on every word. The program will accept data cards which are not load cards but the board must be wired in this case to emit zeros and signs.

Special 7 Instruction Per Card Loading Deck

This special seven card deck must be used rather than other available seven instructions per card loading decks because this one is compressed to fit into the only available drum locations (1900-1944) and also uses the 0051-0058 read strip. This loading program is erased from the drum by the first computation preceding punch-out. Therefore, this deck must be used each time the Fixed Program and a Table Deck are loaded into the computer.

Fixed Program Deck

The Fixed Program Deck includes all program elements not subject to selection, and also initializes and zeros all locations requiring same. It is an incomplete program in that it lacks the program elements that are subject to selection and which are therefore incorporated in the Program Variable Card Deck. If the program is run to ultimate completion and is stopped by a Grand Total Stop Card so that the last card punched is a grand total, all locations are initialized and zeroed automatically by the program. In this case, the Fixed Program Deck does not have to be reloaded for use with either the same Table Deck, a different Table Deck, a different Program Variable Card Deck, or both. When the program is stopped by a Sub-Total stop card, the computer will retain data for all location group categories higher than the highest caused to be punched. Therefore, if the next rerun of the program will not cause any of these higher categories to be punched, the Fixed Program Deck does not have to be reloaded for use with either the same Table Deck, a different Table Deck, a different Variable Card Deck, or both. However, if the next rerun of the program will punch out categories higher than those previously punched, the Fixed Program and Table Decks must be reloaded before rerunning the program. When the Fixed Program Deck does not require reloading, the Table Deck does not have to be reloaded if the same tables are to be used again.

Table Deck

Sixteen, usually identical, tables are used by the computer to develop cumulative frequency distributions of data for each of the ten years in the maximum span between initial and terminal years and for totals in the several location-group categories. The tables are the magnitude intervals used to sort the data, and therefore must be selected with a view to the range of values believed to exist in the data. Because of this, different data fields and different computed data will require different Table Decks.

Each argument of each table is a five digit number followed by five zeros, i.e., XXXXX00000, in which any X can also be a zero. Decimal location in this five digit number is the same as in the data field being analyzed. Each of the sixteen tables ends in number 9999900000, which is not computed as a term in the table but which occupies the last table argument. Maximum length of each table is 44, including first and last arguments. Shorter tables can be used. Tables can start with any number five digits or smaller, and use any system of arithmetic or geometric progression between table arguments, up to but not including the last argument. When identical tables are used in all sixteen columns, which would be the case in all except unusual searches, selection of one table automatically selects the other fifteen.

Tables will commonly be geometric progressions in which:

$$r = \sqrt[n-1]{\frac{L}{a}} \qquad \text{(Eq. 1)}$$

where r = table ratio -- the ratio between successive table terms
a = first table term
L = last table term*
n = number of terms in the table

"a" will commonly be 1, which appears in the table as 00001 00000. "L" will be larger than the largest value the data is expected to develop. This must be less than 99999, since no data field may have more than five digits and 99999 appears as the last argument of each table.

The value of n is not the same as table length for two reasons:

(a) The last table argument is not computed so that, if all table terms are used as table arguments, the maximum value of n would be 43.

(b) Some terms in the progression cannot be used as table arguments because, when rounded off to integers (in the form in which they appear in the table), they duplicate other table arguments.

---

* The table, as loaded, will have one or more arguments beyond L.

To replace duplicating arguments, additional terms must be computed to compensate for duplicating terms which are not to be used. Otherwise, the tables will be shorter than originally intended. This duplication is readily checked and corrected for by a rapid slide rule computation of the table up to the first term that ceases to produce a duplicating value when rounded off. As an example, a table is desired having $a = 1$, $L = 4200$ and a table length of 44. Therefore, as a first approximation with $n = 43$: the computed value of r is $\sqrt[42]{4200} = 1.219$. Using this value of r, the first several table terms compute as follows:

Term No.	Slide Rule Value	Rounded Off Value
1	1	1
2	1.22	1
3	1.49	1
4	1.82	2
5	2.22	2
6	2.70	3
7	3.30	3
8	4.03	4
9	4.90	5
10	6.00	6
11	7.30	7
12	9.00	9

From this computation, it is apparent that four of the first seven terms cannot be used because they produce duplicate table arguments, but that this will not occur in any term after the seventh. Therefore, to get a table length of 44, for this value of r, four table terms higher than 4200 must be computed and used, or there must be successive additional approximations of r to obtain a value for n that will make the last table term approximately 4200. The first such approximation using $n = 47$ cuts the number of terms beyond 4200 to one, and the second using $n = 48$ cuts the number of terms beyond 4200 to zero. Thus, the final value of r to achieve this purpose is: $r = \sqrt[47]{4200} = 1.195$, and computation of the table to 43 arguments may proceed using $a = 1$ and $r = 1.195$, eliminating duplicating values. This may be done by preparing a single table for locations 0000-0043 and reproducing it for columns 1 through 9 and 13 through 18 inclusive, or by using the Table Deck Preparation Program.

Table Deck Preparation Program

For automatic table deck preparation there is a separate Table Deck Preparation Program. This program does not punch out duplicating table arguments. On completion of loading this program, the computer goes to a stop instruction 01 1999 1004, at which time the console is reset to MN DCBA UTSR, where MN are the two digits for the location of the last table argument in column 0000; DCBA are four digits for the first term in the table (a in Eq. 1); and UTSR are four digits for the table ratio (r in Eq. 1) and Program Start is pressed. The computer will proceed to punch out 16 complete tables, including 9999900000 as the last argument of each table.

Since not more than five significant digits can be used in any table argument (XXXXX 00000) it is assumed that the first term in the table DCBA will always be less than five digits in length and may be as low as 1. Therefore, limiting DCBA to four digits should not hamper use of this program. Similarly, table ratio UTSR is limited to four significant digits and the decimal point is assumed to be between U and T. Note that n and L are not loaded in the program, having already been accounted for in the computation of r. For the example previously given, where the table in column 0000 ends on 0043; L = 4200, and r = 1.195, the console setting becomes 43 0001 1195. In this example, the tables will each have as the next to last argument a number as close to 4200 as the accuracy of approximating r will allow. However, if a value of r of 1.219 had been used, the number close to 4200 would have been the 39th table argument and there would be 4 larger ones between it and the final argument of 99999.

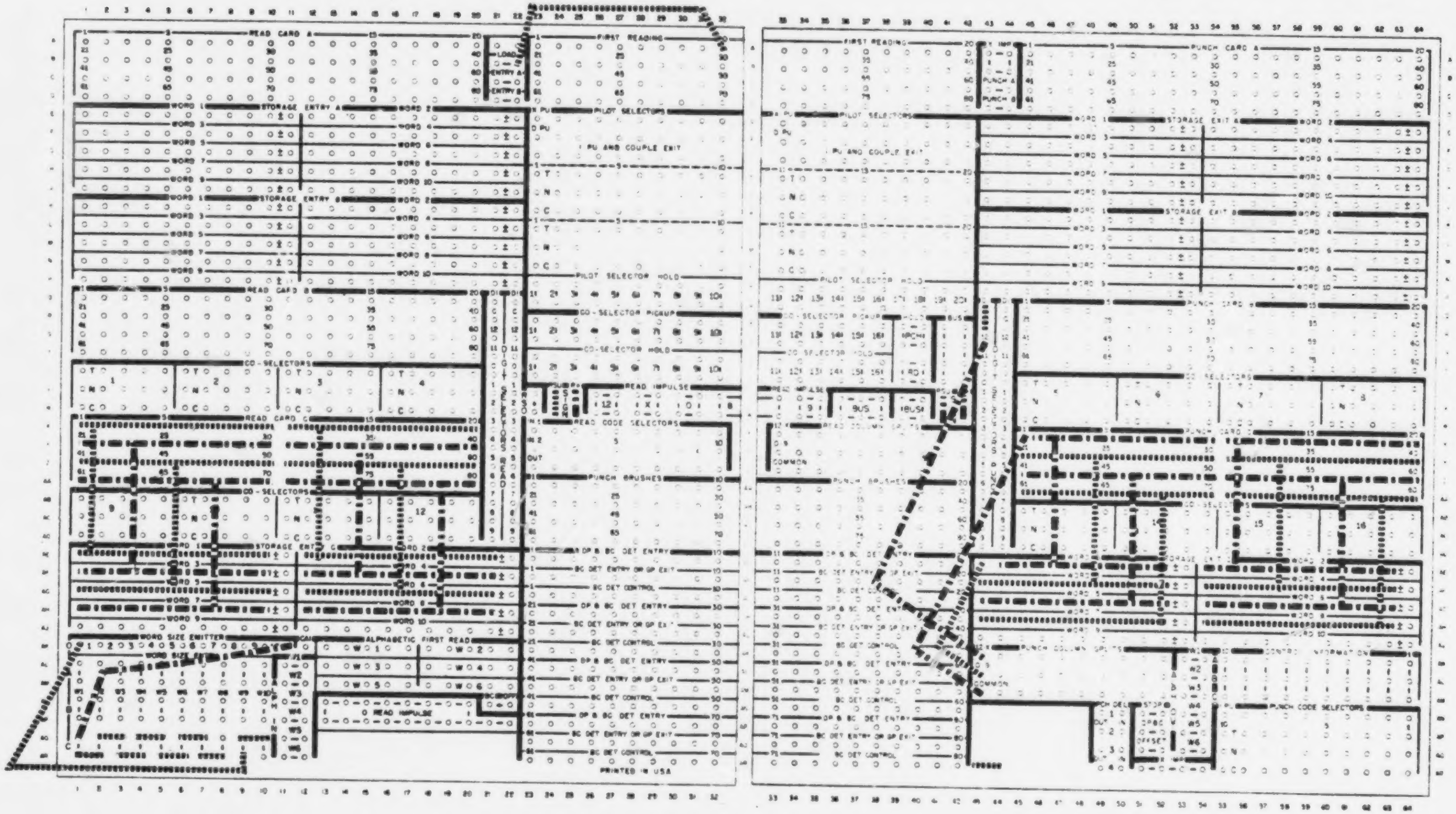
The Duplication Prevention Test stops at a table value of 00019 00000, which would effectively prevent duplication in 4 and 5 digit data fields. For some 2 and 3 digit data fields, where preliminary tabulation shows that duplication will go beyond a table value of 19, it will be necessary to change the word in 1546 from 00019 00000 to 000XX 00000 where XX is larger than the largest table value at which duplication occurs.

When a Table Deck has been punched out, the computer goes to a stop instruction, 01 1999 1004, at which time the console may be reset to a new value of MN DCBA UTSR, program start pressed and a different Table Deck punched out. This process may be repeated as many times as desired.

Table deck cards are punched out as load cards and have a sign on each word.

This program requires 80-80 (Fig. 3) board wiring with signs on each word. It is loaded from a single instruction per card deck with the console set to 70 0051 0051. Press computer reset and program start to load the program. The drum does not have to be zeroed prior to so doing.

FIGURE 3 – 533 CONTROL PANEL WIRING FOR 80×80 BOARD


READ CARD A
FIRST READING
PUNCH CARD A
STORAGE ENTRY A
STORAGE EXIT A
PILOT SELECTORS
I PU AND COUPLE EXIT
PILOT SELECTOR HOLD
READ CARD B
PUNCH CARD B
CO-SELECTOR PICKUP
CO-SELECTOR HOLD
CO-SELECTORS
READ IMPULSE
READ CODE SELECTORS
READ CARD C
PUNCH CARD C
PUNCH BRUSHES
STORAGE ENTRY C
WORD SIZE EMITTER
ALPHABETIC FIRST READ
PUNCH COLUMN SPLITS
PUNCH CODE SELECTORS
DP & BC DET ENTRY
BC DET ENTRY OR DP EXIT
BC DET CONTROL
COMMON
PRINTED IN USA

Program Variable Card Deck

This deck consists of eight mandatory cards (0863, 0050, 1454, 1876, 0374, 0870, 1370, and 0098), a variable number of Operation Cards, and from zero to nine of the Optional Cards (0272, 0468, 0547, 1772, 0144, 1044, 1645, 1119, and 1461).

Mandatory Cards.--One each of the following eight cards must be selected:

(a) 0863 -- Initial Year. -- The computer will compute data for the initial year and subsequent years selected but will not compute data for any years prior to the initial year. The form of this card is:

69 0053 0052 24 0863 8000 AB 0000 0000

where AB is the initial year.

(b) 0050 -- Terminal Year. -- The computer will compute data for any year prior to the terminal year selected but will not compute data for years after the terminal year. The form of this card is:

69 0053 0052 24 0050 8000 CD 0000 0000

where CD is the terminal year.

The difference between initial and terminal years selected cannot exceed ten years but can be as low as zero years, in which case initial and terminal years are the same year. Where enough years of data are available, initial and terminal years may be selected to give a series of two, three, four, or five year running averages from the same data. Where less than ten years data are available and data from all available years are to be computed, the initial year should be selected as either the year of the earliest date known to be in the data or as a year prior to that date; and the terminal year selected as the date of the last year known to be in the data or a subsequent year, provided the ten year maximum span between initial and terminal years is not exceeded. The selection of an initial year prior to that for which there is data and a terminal year subsequent thereto will not adversely affect the operation of the computer nor alter the dates printed out. The dates printed out are dates of actual data within the selected span of years, not the dates of the selected span.

(c) 1454 -- Weekend or Weekday, Population and Topographic Class. -- These selections are made on card number 1454, which contains 30 digits as follows:

69 0053 0052 24 1454 8000 ABCDE 00000

TABLE I. MANDATORY CARDS

									Table Length		OPERATION CARDS (d						
Substance	Alphabetical Identification	Numeric Identification	Initial Year AB 0000 0000	Terminal Year CD 0000 0000	WE-WD, POP, TOPO ABCDE 00000	Field Size (a) 00000 99999	Card Number 00000 0000F	Data Word 60 005X 1116	60 00GH 1289	00 00JK 0000	0398-67 005X 1997	1997-35 000X 1550	1997-35 000X 0944	1344-35 000X 1550	0944-11 8003 1344	1550-21 1009 1206	D.RC-00 0000 1245
			0863	0050	1454	1876	0374	0098	0870	1370							
			AB	CD	ABCDE	99999	F	X	GH	JK	A	A	X	X	-	-	
Suspended Particulate	SP	01	AB	CD	ABC01	09999.	1	3	43	44	3	4	-	-	-	*	+
Suspended Particulate	SP	01	AB	CD	ABC01	09999.	2	4	43	44	4	4	-	-	-	*	+
Benzene Soluble (b)	BS	02	AB	CD	ABC02	0999.9	1	3	42	43	-	-	4	4	*	*	+
Acetone Soluble (c)	AC	03	AB	CD	ABC03	0999.9	1	3	42	43	-	-	4	4	*	*	+
Calcium	CA	04	AB	CD	ABC04	0099.9	1	4	43	44	4	3	-	-	-	*	+
Chloride	CL	05	AB	CD	ABC05	0099.9	1	5	43	44	5	3	-	-	-	*	+
Barium	BA	06	AB	CD	ABC06	09.999	1	5	43	44	5	-	3	4	*	*	+
Fluoride	FL	07	AB	CD	ABC07	009.99	1	5	43	44	5	-	7	3	*	*	+
Antimony	SB	08	AB	CD	ABC08	00.999	2	8	43	44	8	3	-	-	-	*	+
Magnesium	MG	09	AB	CD	ABC09	0099.9	1	6	43	44	6	-	7	3	*	*	+
Sodium	NA	10	AB	CD	ABC10	0099.9	1	7	43	44	7	3	-	-	-	*	+
Potassium	KA	11	AB	CD	ABC11	0999.9	1	7	43	44	7	-	3	4	*	*	+
Beryllium	BE	12	AB	CD	ABC12	00.999	1	7	43	44	7	-	7	3	*	*	+
Arsenic	AS	13	AB	CD	ABC13	009.99	1	8	43	44	8	3	-	-	-	*	+
Silver	AG	14	AB	CD	ABC14	0.0999	1	8	43	44	8	-	7	3	*	*	+
Tin	SN	15	AB	CD	ABC15	009.99	2	4	43	44	4	-	4	3	*	*	+
Maganese	MN	16	AB	CD	ABC16	009.99	2	3	43	44	3	-	5	3	*	*	+
Lead	PB	17	AB	CD	ABC17	0099.9	2	4	43	44	4	-	7	3	*	*	+

(a) Note decimal point location

(b) Also requires operation cards = 0398-65 0053 0043; 0043 - 46 1567 1997

(c) Also requires operation cards = 0398-65 0053 0043; 0043 - 46 0143 1567

(d) For substance magnitude analysis (Do not use for percentage or ratio analysis)

TABLE I. MANDATORY CARDS (Continued)

Substance	Alphabetical Identification	Numeric Identification	Initial Year AB 0000 0000	Terminal Year CD 0000 0000	NE-WD, POP, TOPO ABCDE 00000	Field Size (a) 00000 99999	Card Number 00000 0000F	Data Word 60 005X 1116	Table Length 60 00GH 1289	Table Length 00 00JK 0000	OPERATION CARDS (d) [illegible]-67 005X 1997	1997-35 000X 1550	1997-35 000X 0944	1344-35 000X 1550	0944-11 8003 1344	1550-21 1009 1206	D.[illegible]-00 0000 1545
			0863	0050	1454	1876	0374	0098	0870	1370							
			AB	CD	ABCDE	99999	F	X	GH	JK	X	X	X	X	-	-	
Iron	FE	18	AB	CD	ABC18	0099.9	2	5	43	44	5	3	-	-	-	*	+
Copper	CU	19	AB	CD	ABC19	099.99	2	5	43	44	5	-	3	4	*	*	+
Chromium	CR	20	AB	CD	ABC20	00.999	2	5	43	44	5	-	7	3	*	*	+
Titanium	TI	21	AB	CD	ABC21	009.99	2	6	43	44	6	3	-	-	-	*	+
Vanadium	VA	22	AB	CD	ABC22	09.999	2	6	43	44	6	-	3	4	*	*	+
Molybdenum	MO	23	AB	CD	ABC23	009.99	2	6	43	44	6	-	7	3	*	*	+
Cadmium	CD	24	AB	CD	ABC24	00.999	2	7	43	44	7	3	-	-	-	*	+
Zinc	ZN	25	AB	CD	ABC25	099.99	2	7	43	44	7	-	3	4	*	*	+
Bismuth	BI	26	AB	CD	ABC26	00.999	2	7	43	44	7	-	7	3	*	*	+
Strontium	SR	27	AB	CD	ABC27	009.99	1	6	43	44	6	3	-	-	-	*	+
Nickel	NI	28	AB	CD	ABC28	09.999	2	8	43	44	8	-	3	4	*	*	+
Cobalt	CO	29	AB	CD	ABC29	00.999	2	8	43	44	8	-	7	3	*	*	+
Sulphate	SO	30	AB	CD	ABC30	0999.9	1	4	43	44	4	-	3	4	*	*	+
Nitrate	NO	31	AB	CD	ABC31	0999.9	1	6	43	44	6	-	3	4	*	*	+
Reflectance	RE	32	AB	CD	ABC32	0999.9	1	8	43	44	8	-	3	4	*	*	+
pH	PH	33	AB	CD	ABC33	0099.9	1	4	43	44	4	-	7	3	*	*	+
Radiation	RA	34	AB	CD	ABC34	9999.9	2	3	43	44	3	5	-	-	-	*	+

* Indicates necessary operation cards.
+ Data read card - must always be used as last card in variable deck.

By use of this card, the choice of A selects Weekdays only (Monday-Saturday, inclusive) when A = 1; Sundays only when A = 2; and all days (both weekdays and Sundays) when A = 0. When A = 1 or 2, the data card deck must be punched with a sign (+ or -) on the second word. Where this has not been done and a sign must be emitted for the second word, only A = 0 can be used.

The choice of B selects population class according to the following scheme:

Population Class

0	All classes
1	3 million or more
2	1-3 million
3	700,000 - 1,000,000
4	400,000 - 700,000
5	100,000 - 400,000
6	50,000 - 100,000
7	25,000 - 50,000
8	10,000 - 25,000
9	Under 10,000

All nine population classes are selected when B = 0. There is no way of combining less than all nine classes. When a digit other than zero is used for B, C must be zero. The population class of cities in the National Air Sampling Network is shown in Appendix C.

The choice of C selects topographic class according to the following scheme:

Topographic Class

0	All Urban
1	All Non-Urban
2	Atlantic Coast
3	Desert
4	Farmland
5	Forest
6	Great Lakes Coast
7	Gulf Coast
8	Mountain
9	Pacific Coast

All eight topographic classes are selected when C = 1. When a digit other than zero is used for C, B must be zero. Selection of zeros in both B and C is acceptable and all data for the indicated year and day intervals are selected. However, selection of a digit other than zero for both these locations is unacceptable since it represents an ambiguous selection. The topographic class of cities in the National Air Sampling Network is shown in Appendix C.

DE is used to identify the substance or per cent substance for which data is being computed (Table I).

These digits are necessary to identify the data on the output cards. They do not select the data to be computed. Selection is done by the operation cards.

(d) 1876 -- Field Size. -- Data exist on the data cards in fields of different size. Selection of a data field by the operation cards determines field size. Field size is specified to the computer by a card having the form:

69 0053 0052 24 1876 8000 00000 (9999)9

where the number of nines is selected equal to the size of the field.

This card is usable only where there is either only one field being analyzed or, in the case where ratios or percentages of two or more fields on the same card are being computed, the several fields are all of the same size. Where the computation involves two or more fields of different size, this variable must be incorporated in the operation cards.

(e) 0374 -- Card Number. -- Where data fields exist on more than one card per sample, it is necessary to select the card from which the field or fields are to be used for computation and analysis. Selection is accomplished by a card having the form:

69 0053 0052 24 0374 8000 00000 0000F

where F is the card number.

Not more than eight cards may be used per sample. Each such card has a separate number from 1 to 8. All data necessary for the analysis and computation desired must appear on fields of the card selected.

(f) 0870 and 1370 -- Table Length. -- Once a Table Deck is selected
(g) and its length known, it is necessary to select from the variable card file two cards which vary with the length of table to be used. One of each must be selected. One has the form:

69 0053 0052 24 0870 8000 60 00GH 1289

GH is the location of the last argument of the table (i.e., 99999 00000) in each table column. For example, if the table has 44 arguments and therefore ends in column 0000 on 0043, GH = 43.

The other card has the form:

69 0053 0052 24 1370 8000 00 00JK 0000

where JK is one plus the location of the last argument of the table in column 0000. For the same example above, JK = 44.

(h) 0098 -- Data Word. -- The form of this card is:

69 0053 0052 24 0098 8000 60 005X 1116 (alt. 0144)

in which X is a digit between 3 and 8, inclusive. "X" is the same as the number of the ten-digit word on the data card in which the data field to be analyzed occurs. As an example, if one data field is to be analyzed, in which case the last four digits are 1116, and this data is in card columns 44 through 47, i.e., the fourth ten-digit word, the value for X is 4.

If data are being used from two fields, each in a different data word, X is selected as noted above for one of the two data words and an optional card (0144) is added to account for the second data word. In this case, the last four digits are 0144 instead of 1116.

Operation Cards

The functions of the operation cards are:

(a) To select one or more data fields, each of five digits or less;

(b) Where more than one field is selected, to perform computations to yield a result having five digits or less;

(c) To shift digits from a single data field, or the computed result from multiple data fields, to the right for storage in a computer location in the form: 00000 XXXXX. Because so many different sets of operation cards will be necessary, no attempt can be made to anticipate all of them in advance.

When table length is 44 (i.e., tables end on XX43), the only drum locations available for operation cards are ~~0398~~, 1550, 1997, 0944, and 1344.
1598

Routines which require more steps than can be accommodated on the five drum locations available for a table length of 44 will require a shortening of table length to 43 or less to gain necessary locations. For tables shorter than 44, 19XX is not available, but 00XX to 09XX inclusive, and 13XX to 18XX inclusive are available, where XX = Table Length. Operation cards must be used as complete sets. The number of cards in a set will vary for different routines.

Should it become desirable to analyze ratios or percentages involving fields on two or more cards, the fixed program will have to be altered to provide more than the one read strip for which it is presently prepared, as well as a means for recognizing when to use the additional read strips and for distinguishing which cards are to be read into them.

Operation cards to accomplish substance data analysis are listed in Table I. As an alternate to the use of fixed board wiring and variable operation cards, the same results may be obtained more simply by special board wiring for each substance which will select the substance data field, enter it into the right-hand digits of the third word with zeros to fill the remaining digits to the left. In this case the only operation cards needed are:

69 0053 0052 24 1596 ~~0398~~ 8000 67 0053 1550
69 0053 0052 24 1550 8000 20 1009 1206

Where special board wiring is used and the data cards are punched as load cards on the first column, the load hubs on the board cannot be used.

Optional Cards

The Program will run without these cards. They are added to the deck when needed to accomplish special purposes. Because they duplicate, they cannot be selected by location number alone.

0272, 0468, 0547, 1772 -- Punch By-Pass Suppression Cards. —

To	suppress	Site	Total	punch	By-Pass	0468-46	0472 0472
"	"	City	"	"	"	0547-46	0647 0647
"	"	State	"	"	"	0272-46	0678 0678
"	"	Annual City	"	"	"	1772-46	0278 0278

In the first three location group categories (e.g., site, city, and state) the fixed program prevents the punching of duplicate information where, for instance, there is only one sampling site in a state. In this case state and city totals would duplicate site totals and annual city data would duplicate annual site data. This is accomplished by four automatic compute and punch by-passes which, because they save computer time, are normally kept operative. However, when it is desired to sort program output cards by location group so that each may be separately tabulated, this leaves a hiatus in the sorted group wherever a compute and punch by-pass has occurred. A Punch By-Pass Suppression Card cannot be used in the same Program Variable Card Deck as a Mandatory Punch By-Pass card or a Normal Punch By-Pass Card for the same location group category.

0468, 0547, 1772 -- Mandatory Punch By-Pass Cards: --

To obtain mandatory Site Total punch by-pass 0468-46 0471 0471
" " " City " " " 0547-46 0747 0747
" " " Annual City " " " 1772-46 1676 1676

When a series of different population and topographic category analyses (including all urban or all nonurban) are being run from the same data cards (all other variables being held onstant), the site and city cards, both annual and total, will be the same as those obtained for the condition of "all urban" or "all nonurban" except that in the former case, the categories will be identified by an integer; in the latter case, by a zero. To avoid punching this duplicating information, three mandatory Punch By-Pass Cards have been provided. These save computer time by by-passing the computation and punching time otherwise required. It should be re-emphasized that these Punch By-Pass cards prevent duplication with cards punched by another computer run, and in so doing will leave the output deck of the run in which they are used incomplete. A Mandatory Punch By-Pass Card cannot be used in the same Program Variable Card Deck as a Punch By-Pass Suppression card or a Normal Punch By-Pass card for the same location group category.

Annual site cards cannot be by-passed without addition to the operation cards of two extensive subroutines, which would not be justified by the time saving realized. State Total punch by-pass may be made mandatory by the use of a card 0272-46 0376 0376. However, this card must be used with caution, lest it prevent the punching of cards which do not duplicate those obtained during "all urban" or "all nonurban" runs.

Normal Punch By-Pass Cards -- 0272, 0468, 0547, 1772: --

For normal operation of Site Total punch by-pass 0468-46 0472 0471
" " " " City " " " 0547-46 0647 0747
" " " " State " " " 0272-46 0678 0376
" " " " Annual City " " " 1772-46 0278 1676

These optional cards are provided to restore the program to normal suppression (of only duplicate cards) after either by-pass suppression or mandatory by-pass cards have been used on the preceding run. By including one or more Normal Punch By-Pass Cards as part of the Program Variable Card Deck, reloading of the Fixed Program Deck to restore Punch By-Pass to normal becomes unnecessary. These cards duplicate instructions in the Fixed Program Deck and therefore do not need to be loaded for the first run after loading the program nor for any rerun unless, prior to such rerun, one or more by-pass suppression or mandatory by-pass cards were read into the computer. A Normal Punch By-Pass Card cannot be used in the same program variable card deck as a punch by-pass suppression card or a mandatory punch by-pass card for the same location group category.

0144 -- Second Data Word. -- The form of this card is:

69 0053 0052 24 0144 8000 60 005X 1116

in which X is selected in the same manner as in Mandatory Card 0098. This card is used only when data is being used from two fields on a card, each in a different data word. Where data is used from more than two fields on a card or from more than one card, special programming will be required.

1044 and 1645 -- Laboratory Discrimination Cards. -- The Fixed Program does not discriminate between data developed by different laboratories or networks. Where such discrimination is desired, two optional cards are provided. One (1044) has the form:

69 0053 0052 24 1044 8000 44 1567 1744

and is used to initiate laboratory discrimination. For the particular case of the Sanitary Engineering Center National Air Sampling Network Laboratory, this is the only card that need be added to select only SEC data, i.e., omit data cards identified in columns 29 and 30 other than 00.

Where *only* the data from some other laboratory is to be selected for analysis, card 1645 having the form:

69 0053 0052 24 1645 8000 XX 0000 0000

is used in which XX is the two digit number identifying the laboratory. Card 1645 cannot be used without card 1044 in the above form. For example, the designation of Kettering Laboratory is 01.

1799 ~~1119~~ and 1461 -- Suppression of Normal Monthly or Diurnal Output. --

Where frequency distribution of monthly or diurnal data are desired, this can be accomplished by using a form of data card in which columns 2 and 3 are 01 on all cards, and twelve data fields are used for the same item, data being punched into the field corresponding to the month or hour of their occurrence. The normal monthly or diurnal output should, under these conditions, be suppressed by adding two cards to the Program Variable Card Deck. They are:

69 0053 0052 24 1799 ~~1199~~ 8000 00 0000 1574
69 0053 0052 24 1461 8000 00 0000 1878

The selection of specific month or hour for frequency distribution analysis is accomplished by appropriate operation cards which must be added in addition to these two cards.

FIGURE 4. FORM OF COMPUTER INPUT CARD

CARDS #1 AND #2	Word #1 +						Word #2 Weekday + Sunday -					
	Year (Units) 0 - 9	Month 1 - 12	Region 1 - 9	State 1 - 98	City 1 - 998	Site 1 - 8	Card # – 1 - 8	Population Class 0 - Non-Urban 1 - 3 Million or more (All others same as Fig. 2)	Topographic Class 0 - Urban 1 - Do not punch	Sample #	Day	Year (Tens)
(Col. No.)	1 X	2-3 XX	4 X	5-6 XX	7-9 XXX	10 X	11 X	12 X	13 X	14-17 XXXX	18-19 XX	20 X

	Word #3 Benzene Soluble + Acetone Soluble -			Word #4			Word #5			Word #6			Word #7			Word #8		
CARD #1	Susp. Part.	Benzene or Acetone Soluble	Laboratory SEC -00 KET -01	Ca	SO_4	pH	Cl	Br	F	Sr	NO_3	Mg	Na	K	Ba	As	Be	Ag
(Col. No.)	21-24 XXXX	25-28 XXX.X	29-30 XX	31-33 XX.X	34-37 XXX.X	38-40 XX.X	41-43 XX.X	44-47 X.XXX	48-50 ~~XX.X~~ X.XX	51-53 ~~XX.X~~ X.XX	54-57 XXX.X	58-60 XX.X	61-63 XX.X	64-67 XXX.X	68-70 .XXX	71-73 X.XX	74-77 XXX.X	78-80 .XXX
CARD #2	B Radioactivity	Mn	Laboratory SEC -00 KET -01	Susp. Part.	Sn	Pb	Fe	Cu	Cr	Ti	V	Mo	Cd	Zn	Bi	Sb	Ni	Co
(Col. No.)	21-25 XXXX.X	26-28 X.XX	29-30 XX	31-34 XXXX	35-37 X.XX	38-40 XX.X	41-43 XX.X	44-47 XX.XX	48-50 .XXX	51-53 X.XX	54-57 X.XXX	58-60 X.XX	61-63 .XXX	64-67 XX.XX	68-70 .XXX	71-73 .XXX	74-77 X.XXX	78-80 .XXX

Data Card Deck (for Monthly Distribution Tabulation)

National Air Sampling Network data cards to be analyzed must be in the form shown in Figure 4. No data field may exceed five digits. Decimal point may be where desired. They should preferably be punched as load cards and have a sign on each word. However, the program will handle nonload cards. Where there are blank digits in a word containing the data field on a card to be analyzed, the board must be wired to emit zeros into the blank columns. Cards must be sorted in advance into sequence with respect to both location and time. Location and time identification are in the first 10 columns (1-10) of each data card, viz.: ABCDEFGHIJ (Fig. 4). Their sequential order must be as follows:

		Meaning for NASN Data Analyses
(1)*	All cards in sequence on D (1-9)	Region
(2)*	Within D, all cards in sequence on EF (1-98)**	State
(3)*	" EF " " " " " GHI (1-998)**	City
(4)	" GHI " " " " " J (1-8)**	Site
(5)	" J " " " " " A (0-9)	Year
(6)	" A " " " " " BC (1-12)**	Month

These numbers must be in sequence, but they do not have to be consecutive.

It is not necessary to sort within BC to put cards into sequence with respect to any identification in the second ten columns (11-20) of the data card.

Any portion or selection from the total data card deck which conforms to these rules can be separately used as a data card deck. In other words, analyses can be started at any card in the deck, include any portion of the deck, and can be stopped at any card in the deck.

The sign on column 20 is used to indicate weekday (+) or Sunday (-). The sign on column 30 is used to indicate the solvent used for extraction, i.e., benzene (+) or acetone (-). All other signs are assumed to be +.

---

* Since D and EF will be in sequence when GHI is in sequence, a sort to put GHI into sequence will automatically sort for D and EF.

** No number higher than shown can be used.

Nines in each column of a data field are used to indicate blank data (i.e., lack of the data represented by the data field). Their effect is to cause the next data card to be read without adding the blank data card to any of the counts or adding the nines into any data register. The next lower values, 99998, 9998, etc. should be used to record values higher than the highest values separately identified, which should be 99997, 9997, etc.

The data card form (Fig. 4) required for the computer is not convenient for punching from raw data sheets. Therefore, card should be originally punched in the more convenient form shown in Figure 5. Prior to computer analysis, all cards in this original form should be converted to computer card form by the use of the data card conversion procedure described in Appendix B.

It is most convenient to keep, in addition to the master file of computer cards in the sequence required for the computer, two additional files of unconverted original form cards, one of completed cards and one of incomplete cards. Sequence in the completed unconverted card files is not important since these cards do not require sorting until after conversion to computer form. By keeping the incomplete unconverted card file in filter number sequence with index cards, incomplete cards may readily be removed for addition of data and if still incomplete after such data addition, returned to their appropriate location in the incomplete card file. When complete, these cards should be added to the complete unconverted card file.

Where the Fixed Program is used without change, the data from only one card number may be used at a time. Under these conditions, it is preferable to maintain a separate sequential file of computer cards for each card number.

Only if a special adaptation of the program is made to use data from more than one card for a computation is there justification for a computer card file in which for each site and date all card numbers are grouped.

The computer accepts or ignores data on a card so that it is not mandatory to sort the data deck to remove cards whose data are to be ignored. The decision as to whether it is desirable to sort out data cards before making a computer run should be based on a time and cost analysis. It must be remembered that the 650 is a very efficient card sorter, and such sorting does not disrupt the card sequence.

Data Card Deck (for Diurnal Distribution Tabulation)

The only change needed to get Diurnal Distribution for data taken twelve or fewer times per day per site, instead of Monthly Distribution, is the designation of columns 2 and 3 to represent two hour or longer intervals (designated 1-12 inclusive).

FIGURE 5. FORM OF NATIONAL AIR SAMPLING NETWORK DATA CARD

NASN CARDS #1 AND #2	Card No.	Reg. No.	State No.	City No.	Site	Population Class	Topographic Class	Month	Day	Weekday or Weekend	Year	Filter No.	Particulate
Col. No.	1	2	3-4	5-7	8	9	10	11-12	13-14	15	16-17	18-22	23-26
	X	X	XX	XXX	X	X	X	XX	XX	X	XX	XXXXX	XXXX

NASN CARD #1	Or-ganic	Rad-act.	Ba	Be	SO_4	NO_3	pH	Re	F	Cl	As	Ca	Mg	Sr	Na	K
Col. No.	27-30	31-35	36-39	40-42	43-46	47-50	51-53	54-56	57-59	60-62	63-65	66-68	69-71	72-74	75-77	78-80
	XXX.X	XXXX.X	X.XXX	.XXX	XXX.X	XXX.X	XX.X	XX.X	~~XX.X~~ X.XX	XX.X	X.XX	XX.X	XX.X	~~XX.X~~ X.XX	XX.X	XX.X

NASN CARD #2	Rad-act.	Mn	Pb	Sn	Fe	Cu	Ti	V	Zn	Cr	Ni	Mo	Co	Bi	Cd	Sb
Col. No.	27-31	32-34	35-37	38-40	41-43	44-47	48-50	51-54	55-58	59-61	62-65	66-68	69-71	72-74	75-77	78-80
	XXXX.X	X.XX	XX.X	X.XX	XX.X	XX.XX	X.XX	X.XXX	XX.XX	.XXX	X.XXX	X.XX	.XXX	.XXX	.XXX	.XXX

Data Card Deck (for Concurrent Monthly and Diurnal Distribution Tabulation)

The simplest procedure is to have columns 2 and 3 represent months and column 11 (card number) represent three hours or longer intervals (designated 1-8 inclusive) and to have all other identifying digits in the first twenty columns the same, except for sample number. A separate pass through the computer will be needed for each card number, i.e., hourly interval.

A more complex procedure to punch both monthly and diurnal distributions in one pass of data cards through the computer is to use multiple data fields for each of the two hour or longer time intervals of the day and use in the Operation Cards a program to accomplish the desired objective.

Stop Cards

Two forms of stop card are provided: one which causes and one which does not cause a grand total to be punched before stopping the program.

Grand Total Stop Card -- 000DEFGHIJ (Columns 11-80 all zero). -- This form is used when either (a) it is desired to include a grand total in the computed cards punched, or (b) it is desired that all registers be initialized at the completion of computation so that the next run may punch all types of totals.

Sub-Total Stop Card -- 000DEFGHIJ9(Columns 12-80 all zero). -- This form is used when the highest location group category it is desired to compute and punch is less than a grand total and no subsequent rerun prior to reloading the Fixed Program and Table Deck will require the computing and punching of output cards from a higher location group category than punched since original loading of the program. This need occurs when it is determined in advance that all runs will be stopped at the same type of subtotal (e.g., site or city) and that no computation for higher categories (e.g., state, region, national) will be required.

In these cards DEFGHIJ have the same meaning as in the first word on data cards. To induce a punch in any category, the location numbers of that category and all lower categories other than site must be higher than that on the last data card to be analyzed. Although J must be higher than J on the last data card to be analyzed to induce only a site-total punch, it should be 1 on cards to induce higher category punches. To induce a regional or grand total for D = 9 on the data card, make D = 0 on the stop card.

Examples: (1) To induce all possible punches after data card having in columns 1-10 the number 5119 50 8956, the stop card should read 0000 51 8961 (all other columns zero). (2) To induce only site and city punches after this data card, the stop card should read 0009 50 8961 (all other columns zero).

RUNNING THE PROGRAM

LOADING THE COMPUTER

(1) The loading deck, the fixed program deck, and the table deck are combined in that order. The controls are set as indicated in Table II-A and computer reset and program start are pressed to read these cards into the computer. The drum does not have to be zeroed prior to so doing.

(2) The deck of program variable cards, the data read card, the data card deck, and a stop card are combined in that order, with the stop card following the last data card to be analyzed. The controls are set as indicated in Table II-B and computer reset and program start pressed to both read the variable card and the data read card into the computer.

TABLE II. CONSOLE SETTINGS

Switch Controls	A Fixed Program	B Variable Program Deck and Data Read Card	C Data Card Deck
Programmed Switch	Stop	Stop	Stop
Half Cycle	Run	Run	Run
Address Selection	Anything	Anything	Anything
Control	Run	Run	Run
Display	Program Register	Program Register	Program Register
Overflow	Stop	Stop	Stop
Error	Stop	Stop	Sense
Storage Entry	70 1901 1901 +	70 0051 0051 +	01 1990 1567 +

STOPS

Program Completion Stops

Two of the stops occur as the result of satisfactory completion of analysis of a data card deck and indicate that the computer is ready to analyze another data card deck (or the same data card deck with a change in the Program Variable Card Deck). Both these stops initialize on the first data card read in on the rerun. They are:

01 1997 1545 -- Grand Total Stop. -- This stop occurs after punching out a grand total and initializing the grand total registers and table. Since this stop cannot occur until all other registers and tables are also initialized, the computer is ready for any type of rerun by filling the read hopper with cards.

If another data card deck is to be analyzed in the same manner as the previous deck, just the data card deck plus a stop card need be placed in the read hopper and Program Start pressed.

If the same or another data card deck is to be run with one or more changes in the Program Variable Card Deck, it will be necessary to proceed as in (2) under "Loading the Computer."

01 1996 1545 -- Subtotal Stop Card Stop. -- This is an intentional stop after punching out totals other than a grand total. Totals and table counts still remain in the machine for categories higher than the last punched out and are initialized for the last category punched out and all lower categories in the following order of precedence: Annual site → Site Total → Monthly, Annual and Total City → State Total → Regional Total → Grand Total. Therefore on this stop the computer is ready for rerun of all categories the same and lower than the last category punched on the run just ended. Therefore, the procedures outlined for Grand Total Stop can be followed in this case, with the special precaution that the stop card must cause a stop on the same category as on the previous run (i.e., there be no increase in digit on the stop card in the columns for the categories not to be punched.)

COMPUTER FAULT STOP

One of the stops is caused by sum overflow: 01 1995 1661. This stop occurs because a sum greater than ten digits has been developed by the addition to one of the sum registers: 1388, 1488, 1588, 1688, or 1788. The contents of these registers are later used in ten digit form to compute averages. When this overflow occurs, it is first necessary to discover which register overflowed. The accumulator will contain the sum which overflowed and the distributor the number just added in. The difference will be the contents of the sum register to which the addition was made. Therefore, by displaying the sum registers starting with 1388, the one which contains this difference is the one which overflowed. The simplest procedure is to record the sum, reset the sum register to zero by pressing Accumulator Reset and proceed by pressing Program Start. All averages for this category will thereafter be spurious. They can, however, be computed on a desk calculator by reconstituting the sum by multiplying the average by the count; then adding this sum to the sum which overflowed; and finally, dividing the total by the count.

DATA CARD FAULT STOPS

Five of the stops are caused by data card faults. A card fault stop is caused by one specific fault and does not find other faults on the same card that have not yet been tested. Those not yet tested need to be checked on the card to be sure that the card does not contain more than one fault. The order in which card faults are tested is:

1. Blank numbers and double punches
2. Location sequence
3. Year sequence
4. Month sequence and 00 month
5. Month greater than 12

In connection with items 4 and 5, if the card following a month sequence, 00 month or month greater than 12 fault is for another site or year and if a corrected card is not substituted for the faulty card, the month and year registers must be reset from the console before going to 1567.

When card fault stops occur, the general procedure should be to run the cards out of the read hopper without reading them into the machine, count back to the fourth card on which the stop occurred, inspect it (and the previous and succeeding cards where necessary) to find the fault; correct the fault, if possible, or discard the faulty card; place the data cards back into the read hopper and press Program Start. This reads the next card which preferably should be a replacement for the faulty one. These five stops are:

01 1990 1567 -- Error Sense. -- This stops because of a double punch, a blank column or, in the case of a properly punched card, of a read failure. Reuse the card if it is good or duplicate it if it is bad, and proceed as above.

01 1994 1567 -- Impossible Month (Bi-Hourly period greater than 12). This stops because a month or two hour period is punched greater than 12 (a zero causes a monthly or bi-hourly sequence fault rather than an impossible month fault). If the correct month has not yet been read into the computer, the card can be corrected and inserted into its proper place in the deck. If the cards for the correct month have already been read in, by omitting the faulty card from the analysis, the analysis of the rest of the deck may be made to proceed as described above.

01 1991 1567 -- Location Sequence Fault
01 1992 1567 -- Annual Sequence Fault
01 1993 1567 -- Monthly or Bi-Hourly Sequence Fault

These stops are caused by cards out of required sequence. Where one card is out of sequence, the possibility of a number of others also being out of sequence should be suspected, and a number of cards should be inspected to determine whether the fault causing the stop was unique or systematic.

Sequence fault stops locate card of earlier date or lower category number than the cards already analyzed. Where the faulty card should have been read in previously, it should be omitted to allow the analysis of the rest of the deck to proceed.

Where a card of later year or higher location category is out of sequence among cards of earlier year or lower location category, it will induce annual or location category punches, but the following card being of earlier date or lower location category will run to a data card fault stop. The output cards thus punched are spurious and must be destroyed. All registers will contain the data from the faulty card, since this was read in after punching output cards but before the next card caused the stop. It is therefore necessary to prepare and insert a stop card later in sequence than the card which was out of sequence in order to initialize the program registers. Assuming that one or more regional totals had been punched before coming to this stop, the simplest course is to go back to the first data card after the last good regional total punch and start a new analysis. This will lose the grand total, which will no longer be valid, but will preserve the validity of all other totals without requiring a complete data card deck rerun. To get a valid grand total, the entire data card deck must be rerun.

INITIAL RUN PROGRAM

The first time a data card deck is run through the National Air Sampling Network program two factors are unknown: (a) the extent of data card deck faults, and (b) the range of values to be distributed in the frequency distribution.

A consequence of the former is that some out of sequence cards will have to be removed from the deck to allow the program to proceed; others will have to be removed for correction of blank or double punches, impossible month, etc. These removed cards will not be included in the tabulations. Lack of knowledge of data value range necessitates a wider tabular range than if the minimum and maximum values were known in advance.

Both these consequences can be avoided by a special Initial Run Program which will run the entire data card deck at card read speed (200 cards per minute) with no computation other than for minimum and maximum values. Only one card is punched at the conclusion of the run. This gives the sum the count (number of samples), the minimum and the maximum. All other values are punched zero. Data card deck faults that would stop the complete program will stop this special program. Thus, a run of the data card deck using the Initial Run Program followed by correction of the deck where stops occur is the quickest way of insuring that the deck will run through the real program without a data card deck fault stop.

The table deck best able to discriminate between values in the frequency distribution can then be prepared if "r" in Eq. 1 is computed using the minimum value as "a" and the maximum value as "L". The minimum value is also used as "a" in the console setting for the Table Deck Preparation Program. For instance, if the minimum and maximum values turn out to be 40 and 800 respectively, and the table noted in the example on pages 7-11 were used, the first fifteen and the last nine table values would be beyond the range of the data and therefore not used in the frequency distribution. Out of a total of 43 table arguments, 24 would have been wasted. A table having 40 as its first argument and 800 as its last one would use all the table arguments in the frequency distribution, thereby considerably increasing the accuracy of interpolation between table values performed by the program in computing the nine decile values.

Since the range between minimum and maximum will tend to be greater for larger blocks of data than for smaller ones, basing the table deck range on the entire body of data will give less precise frequency distribution interpolation than basing it on one or more smaller segments of the data.

The Initial Run Program (after drum has been zeroed) is loaded from a console setting of 70 0051 0051 and is followed by the Program Variable Card Deck (without cards 0098, 0870 and 1370 but including the operation cards and, if laboratory discrimination is desired, cards 1044 and 1645, but no other optional cards), the Data Read Card, the Data Card Deck and a Grand Total Stop Card. Proceed otherwise as with the regular National Air Sampling Network Program.

Where output cards giving count, minimum, and maximum for portions of the total data card deck are desired, they can be obtained by inserting grand total stop cards at more than one location in the deck. After each punch, the program will go to 01 1997 1545. The next portion of the deck with its own grand total stop card can then be checked by pressing program start.

OUTPUT CARD IDENTIFICATION

An output card is identified as an annual card by zeros in columns 9 and 10; as a site card by zeros in columns 3 and 4; as a monthly city card by an 11, 22, 33, or 44 in columns 9 and 10; and as a total (i.e., total of years between initial and terminal years) card by a number higher than 4 in column 9. The type of total is identified, on all except cards having zeros in columns 3 and 4 (i.e., site cards) by the replacement of location identification by zeros.

Interpretation

The deciles are computed from the frequency distribution by linear interpolation. Where the population in a decile interval is zero, there is no interpolation and the decile is given the value of the high table argument of the interval.

Output Card Sorting

Monthly or Diurnal City Cards, because of their difference in form, must be separated from other output cards for tabulation. This separation is accomplished by sorting the output deck on column 9 for 1, 2, 3, 4 and rejecting all other cards. At this time the cards are in the following groups:

1 - Monthly or Diurnal city count (11)
2 - " " " " maximum (22)
3 - " " " " average (33)
4 - " " " " minimum (44)
Reject - Remainder of output cards

If it is desired, these groups can be further sorted by year interval by sorting on columns 17, 18 and 19, 20.

The remainder of the output deck, when duplicating output cards have not been punched (i.e., all Punch By-Passes operative), generally requires no further sorting prior to tabulation. When mandatory punch by-pass cards have been used, cards should be sorted as described below.

1 - Arrange cards in sequence for Columns 4-6 and group as follows:
    a. 000 -- State, Regional and Grand totals
    b. 001-999 -- Site and City totals

2 - Arrange group 1a cards in sequence for Columns 2 and 3 and group as follows:
    a. 00 -- Regional and grand totals
    b. 01-52 -- State totals

3 - Arrange group 2a cards in sequence for Column 1 and group as follows:
    a. 0 -- Grand total
    b. 1-9 -- Regional totals

4 - Arrange group 1b cards in sequence for Columns 2 and 3 and group as follows:
    a. 00 -- Annual site and site totals
    b. 01-52 -- Annual city and city totals

5 - Sort group 4a cards for 0 in Column 10 and reject other cards.
    a. 0 — Annual site
    b. Rejects -- Site totals

6 - Sort group 4b cards for 0 in Column 10, reject other cards.
    a. 0 -- Annual City
    b. Rejects -- City totals

7 - Annual site and annual city cards can be further sorted by year by sorting on columns 7-8. Total cards can be further sorted on year interval by sortings on columns 7-8 and 9-10.

ALPHABETIC IDENTIFICATION CARD PREPARATION PROGRAM

This program punches a deck of cards from which may be tabulated a list of identifying city, state, region, national, substance and day names and alphabetic abbreviations in the same sequence as the deck of output cards (either before sorting or after any form of sorting) and with the same first ten digits to allow verification that the name sequence and the output card sequence is the same. The program requires the use of five card decks, viz.:

(a) A Substance Card Deck
(b) The Name Card Loading Deck
(c) A Name Card Deck
(d) The Location Identification Deck
(e) The deck of output cards to be interpreted

The Special Board Wiring required for this program is shown in Figure 6.

In use, the first three of these five decks are combined in that order and, with the console set to 70 0001 0001 computer reset and program start are pressed to load the substance and name cards into the computer. This portion of the program will come to a stop after the last name card has been read in, if there are fewer than 287 name cards, or if there are more, after reading in the 287th card. Combine the last two decks, set console to 70 1951 1951, press computer reset and program start to read in the remainder of the program (the Location Identification Deck) and proceed to read output cards and punch corresponding alphabetic identification cards. This portion of the program will come to a stop after the last output card has been read in and the last identification card punched.

To process other output card decks using the same name and substance card decks, add each additional deck and press program start. To process other output card decks using a different name or substance card decks, the entire program has to be reloaded using the new name and substance card decks.

Name Card Deck

Two hundred and eighty-seven different name cards can be loaded. The usual loading would include:

1 Blank Name Card
1 Grand Total Name Card
9 Regional Total Name Cards
52 State (or Territorial) Total Name Cards
224 (or fewer) City Name Cards

If the output card deck has been sorted to include only city or site cards, the name card deck can be:

1 Blank Name Card
286 (or fewer) City Name Cards

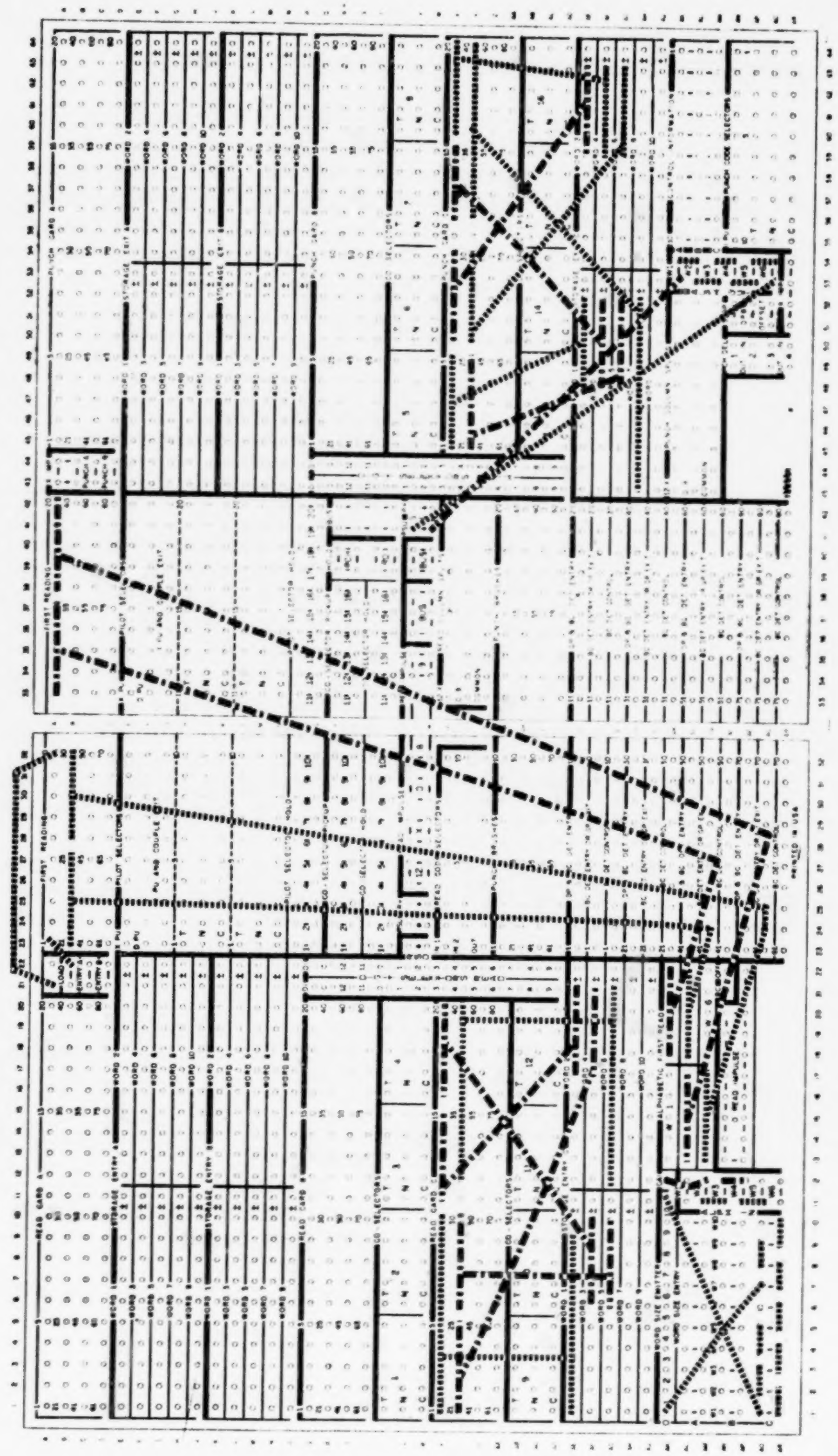


FIGURE 6 - 533 CONTROL PANEL WIRING FOR ALPHABETIC INPUT-OUTPUT

Similarly, if the output card deck includes only state total cards, the name card deck can be restricted to the 52 State Total name cards.

Although the use of a Blank Name Card is recommended, its inclusion is not essential since the last number in the table (99 9999 9999) has a blank name. Therefore the omission of the Blank Name Card (00 0000 1300) will, for short name card decks, require the table look-up to go to the 288th table argument to find a blank name instead of finding it earlier if loaded as 00 0000 1300.

Name cards are punched with the first ten digits numeric and the next twenty alphabetic (including blank spaces), viz.:

00 0000XXXX ABCDEFGHIJ KLMNOPQRST

in which columns 1-6 are zeros and columns 11-30 are either letters or spaces. Columns 7-10 are the city, state, and regional identifying numbers modified as indicated below plus two special identifying numbers:

Location Category	Columns 7-10	Indentation	Number of Letters	Words
City	0XXX	None	20	"City Name" "State Abbrev."
State	10XX	Two Blank Spaces	18	"State Name" Total
Region	110X	Four " "	16	"Region Name" Total
Grand	1200	" " "	16	Grand Total
Blank	1300	None	20	All Blank

No punctuation can be used.

The above table shows that "Region Name" is limited to a maximum of 10 letters and "State Name" to 12 letters. In City names, the state name or abbreviation should be the same for all cities in the state. Since some city names will be long, this will generally require the use of abbreviations (or names) of five letters or less. Where the total of the state abbreviation and the city name (and the space between them) are over 20 letters, the state abbreviation should remain uniform with that used for other cities in the state, and the city name will have to be abbreviated without the use of any puncutation.

Name cards should not be punched as load cards nor have a plus sign on the first word. They must be sorted on columns 7-10 to put them into numerical sequence before loading. Name cards can be added to or removed from a name card deck at will as long as the final combination of name cards loaded is sequential on columns 7-10. There must, however, be a name card loaded for every city, state, and regional number in the output card deck to be interpreted. Where in an output deck which includes state, regional and grand totals, there are more than 224 city names, the preferred procedure is group name card loading so as to load all the state name cards, all the regional name cards (even though all will not be used in each run), the Grand Total card (even though it may not be used until the last group is run) and the Blank card, in that order at the back of each group and to split the city name cards into groups of 224 or fewer cards. Therefore from 224 to 448 city name cards, the name card deck should be split into two about equal groups; from 448 to 669 into three groups; from 669 to 892 into four groups; and over 892 into five groups.

The city number of the first and last city name card loaded in a group must be noted and the output deck to be converted must be split into groups such that the first city number in an output card group is equal to or larger than the number of the first city name card loaded in a group; and the last city number in an output card group is equal to or smaller than the number of last city name card loaded in a group.

Substance Cards

Not more than 99 Substance cards can be used. Substance cards are punched:

Col. 1-10	Col. 11-15	Col. 16-30	Col. 31-40
69 0002 0006	Blank ZZZZ	Blank	24 16AA 8000

in which the numeric AA is the substance, percent substance or substance ratio identification number (Table I). The alphabetic ZZZZ is used as follows:

For substance AA -- Blank XX Blank
For percent substance AA of Total BB -- XX Blank Y
For ratio: Substance AA/Substance CC -- XX YY
e.g.: For Tin -- Blank SN Blank
For Percent Tin of Suspended Particulate -- SN Blank S
For ratio Tin/Lead -- SNPB

At present, only the first 49 of the possible 99 numbers should be assigned in order to allow numbers for nonparticulate samples at a later date. The number 50 should be used for special substances, percentages or ratios not on the regular list. A special substance identification card will have to be made up for this number each time it is used.

Location Identification Cards

These cards are punched in 50 columns as follows:

(a) Columns 1-30 (alphabetic)
Columns 1-20 -- The Name (See Name Card)
21-30

21	22-3	24-5	26	27-30
Site #	Initial Year	Terminal Year	Day	Substance Abbrev. (See Substance Card)
Blank or Number	Number	Blank or Number	B W or S	XXXX

(b) Columns 31-50 Numeric

31	32	33-40	41-50
Population Class	Topographic Class	Zeros	Word #1 from Output Card

(c) Columns 51-80 Blank

The form of the location Identification Card in Columns 1-32 is the same for monthly, annual, and total cards, i.e., site and year which are located differently for these three forms of card in columns 1-20 are uniformly located in columns 1-32 of the Identification Card in order to simplify the printing of column headings.

Name Suppression

This program only prints a name the first time it occurs and causes the name and word to be blank for all subsequent cards until a name change occurs. This is desirable where the only output card sort is to remove Monthly city cards. Where another form of output card sort has been used, it is preferable to have the location name printed in each instance even if it is repetitious. This can be accomplished by adding as next to the last card in the Location Identification Deck a Blank Suppression Card reading:

69 1953 1952 24 1843 8000 44 1947 1947

This card should be removed when repetitious name suppression is desired.

OUTPUT CARD FILING

Program output cards and alphabetic identification cards should have separate indexed files in each of which there should be separate indexed city, state, regional, and national files. The state, regional, and national files should be subclassified first on SUB, then on D, P, T, and year interval in that order.

The city files should be subclassified first on SUB, then on Site, D, and year interval in that order.

The date of the computer run and the number of the run for that date should be hand-stamped on the front or back of each output card and a register, in book or card form, kept in which each day's runs are described. Similarly, a tabulation of this output of each run before sorting should be kept in file similarly identified with respect to date and number of run.

OUTPUT TABULATION

FREQUENCY DISTRIBUTION

STATION LOCATION	SITE	YEARS	No. OF SAMPLES	(MICROGRAMS PER CUBIC METER)											
				MIN	MAX	AVG	FREQUENCY DISTRIBUTION—PERCENT								
							10	20	30	40	50	60	70	80	90
WATERBURY CONN	1	54	12	11	174	94	11	40	76	89	94	100	105	134	145
	1	55	31	54	330	169	94	110	123	145	176	191	206	221	236
	1	56	45	72	454	189	92	105	132	145	171	188	219	257	347
	1	54 56	88	11	454	169	80	99	115	134	155	180	199	223	278
HARTFORD CONN	1	57	26	35	314	124	55	79	89	105	116	127	136	158	201
NEW HAVEN CONN	1	57	23	51	201	100	52	60	65	92	100	105	114	123	162
STAMFORD CONN	1	57	26	20	247	112	40	67	74	83	100	123	134	179	194
PORTLAND MAINE	1	57	18	46	265	121	47	80	85	97	114	130	145	154	171
BOSTON MASS	1	54	12	119	219	150	111	117	127	132	136	141	145	186	201
	1	55	51	57	388	126	73	86	94	100	110	123	137	155	213
	1	56	46	66	472	155	83	92	109	123	145	164	178	194	236
	1	57	26	72	214	137	83	89	105	117	132	145	162	191	210
	1	54 57	135	57	472	140	80	91	102	114	128	140	160	183	219
PITTSFIELD MASS		55	9	47	103	78	47	60	65	71	76	76	93	97	101
		56	19	36	92	57	36	38	40	51	58	60	65	76	85
		55 56	28	36	103	64	37	40	47	57	62	68	76	85	95
EVERETT MASS	1	54	13	33	226	104	34	55	71	76	105	123	134	145	201
	1	55	52	39	353	122	65	74	90	97	104	117	136	171	210
	1	56	43	61	293	137	78	87	107	116	129	142	154	165	236
	1	54 56	108	33	353	126	66	79	90	102	115	129	147	165	207
LAWRENCE MASS	1	57	26	21	186	74	34	38	50	55	65	76	94	102	130
LYNN MASS	1	57	21	43	253	108	47	65	76	81	89	114	134	154	171
SOMERVILLE MASS	1	57	26	37	191	87	45	50	58	65	80	94	105	119	145
WORCESTER MASS	1	57	26	34	219	106	44	60	71	94	110	123	136	145	161
MANCHESTER N H	1	57	17	40	152	70	44	47	52	58	65	68	73	97	105

MONTHLY DISTRIBUTION

STATION LOCATION	YEARS	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
WATERBURY CONN	54 56												
NUMBER OF SAMPLES		4	6	8	7	8	8	5	6	6	11	9	10
MAXIMUM		181	336	266	291	271	411	197	191	172	347	454	330
AVERAGE		140	215	158	193	158	188	144	132	142	145	209	179
MINIMUM		112	73	98	131	81	69	101	54	97	11	72	59
HARTFORD CONN	57												
NUMBER OF SAMPLES		2	2	3	2	2	1	3	2	2	2	3	2
MAXIMUM		192	279	314	113	118	124	149	87	130	84	136	216
AVERAGE		157	202	182	96	115	124	93	77	107	68	97	181
MINIMUM		122	125	91	80	112	124	38	67	85	52	35	147
NEW HAVEN CONN	57												
NUMBER OF SAMPLES		2	2	2	2	2	1	3	2	1	3	1	2
MAXIMUM		146	142	120	59	94	109	115	115	158	94	101	201
AVERAGE		121	116	89	57	77	109	72	107	158	72	101	181
MINIMUM		97	90	59	56	61	109	51	99	158	55	101	162
STAMFORD CONN	57												
NUMBER OF SAMPLES		2	2	2	2	3	2	3	1	3	1	2	3
MAXIMUM		102	184	133	222	131	193	182	72	136	99	96	247
AVERAGE		88	179	76	127	81	135	133	72	109	99	68	147
MINIMUM		74	174	20	33	46	77	83	72	73	99	40	73
PORTLAND MAINE	57												
NUMBER OF SAMPLES			1	2	2	2	2	2		1	1	2	3
MAXIMUM			156	133	157	78	130	62		118	265	135	209
AVERAGE			156	117	123	62	115	54		118	265	128	151
MINIMUM			156	101	89	46	100	47		118	265	122	89
BOSTON MASS	54 57												
NUMBER OF SAMPLES		10	9	11	10	10	12	12	11	10	15	14	11
MAXIMUM		348	211	256	472	160	157	130	182	117	202	193	388
AVERAGE		214	181	153	165	126	105	88	104	97	141	141	185
MINIMUM		79	125	90	68	77	57	71	62	72	96	97	96

APPENDIX A

SPECIAL 7 PER CARD PUNCH ROUTINE

The 7 per card Punch Routines available in Library Programs require more locations than can be used in the National Air Sampling Network Program. Therefore, one has been adapted to fit into locations 1900-1942 and the 1077 punch strip. It is on single instruction load cards that require for loading a console setting 70 0051 0051 +. Press computer reset and program start. After loading, the computer will stop on an 01 code, at which time the console is reset to 00 XXXX YYYY to punch 7 per card load cards from drum locations XXXX to YYYY inclusive. The Program start switch initiates punching and the computer stops on the 01 code on completion. The console will then accept a new setting 00 XXXX YYYY, allowing another section of the drum to be punched, etc., etc.

Where this routine is used to punch the contents of the drum after it has been loaded using the special 7 instruction per card loading program, and a revision deck of single instruction (69 0053 0052) cards, the special 7 per card Punch Routine must be loaded after the contents of the drum have been loaded, not before.

NASN SPECIAL 7 PER CARD PUNCH ROUTINE

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1900	01	0000	1901	
1901	65	8000	1937	
1937	69	1940	1916	
1916	22	1915	1902	
1902	35	0004	1913	
1913	22	1917	1921	
1921	65	1920	1925	
1925	35	0004	1909	
1909	16	1912	1935	
1935	20	1939	1942	
1942	65	1915	1903	
1903	10	1906	1911	
1911	15	1939	1931	
1931	20	1923	1904	
1904	16	1939	1910	
1910	69	1920	1924	
1924	22	1077	8002	
1938	16	1923	1905	
1905	11	8003	1914	
1914	45	1918	1934	
1918	10	8001	1928	
1928	15	1923	1908	
1908	15	1912	1919	
1919	10	8001	8002	
1934	15	1923	1907	
1907	16	1917	1927	
1927	46	1929	1922	
1929	71	1077	1926	
1926	15	8001	1936	
1936	15	1912	1903	
1922	66	8002	1930	
1930	30	0004	1941	
1941	15	1077	1932	
1932	20	1077	1933	
1933	71	1077	1900	
1940	69	0000	8003	
1906	24	1078	1938	
1920	00	0000	0007	Constants

APPENDIX B

CONVERSION PROCEDURE

As a matter of convenience, National Air Sampling Network data is keypunched as indicated in Figure 4. (A keypunch with àlternate program device is recommended as two cards are prepared for each sample.) After a quantity of cards have been keypunched they are converted to computer input cards (Fig. 3) by the use of a reproducing punch. During the reproduction process computer cards number 1 and number 2 are made from National Air Sampling Network cards number 1 and 2, respectively, by the following transformation of data fields.

Transfer	Columns of NASN Card #1	to	Columns of Computer Card #1
Card No.	1		11
Region	2		4
State	3-4		5-6
City	5-7		7-9
Site	8		10
Population Class	9		12
Topographic Class	10		13
Month	11-12		2-3
Day	13-14		18-19
Day of Week	15 1 = weekday 2 = weekend		20 + = weekday - = weekend
Year	16		20
	17		1
Filter No.	19-22		14-17
Particulate	23-26		21-24
Organics	27-30		25-28
Ba	36-39		44-47
Be	40-42		68-70
SO_4	43-46		34-37
NO_3	47-50		54-57
pH	51-53		38-40
Re	54-56		75-77
F	57-59		48-50
Cl	60-62		41-43
AS	63-65		71-73
Ca	66-68		31-33
Mg	69-71		58-60
Sr	72-74		51-53
Na	75-77		61-63
K	78-80		65-67

Gang punch 0 - Col. 64 and Col. 74 except when Col. 65-67 or 75-77 contains all 9's, then gang punch a 9.

Gang punch laboratory in 29-30
SEC - 00
Ket - 01

Gang punch 9 in 78-80

Gang punch + on 1, 10, 30, 40, 50, 60, 70, 80

Transfer	Columns of NASN Card #2	to	Columns of Computer Card #2
Card No.	1		11
Region	2		4
State	3-4		5-6
City	5-7		7-9
Site	8		10
Population Class	9		12
Topographic Class	10		13
Month	11-12		2-3
Day	13-14		18-19
Day of Week	15 1 = weekday 2 = weekend		20 + = weekday - = weekend
Year	16		20
	17		1
Filter No.	19-22		14-17
Particulate	23-26		31-34
Radioactivity	27-31		21-25
Mn	32-34		26-28
Pb	35-37		38-40
Sn	38-40		35-37
Fe	41-43		41-43
Cu	44-47		44-47
Ti	48-50		51-53
V	51-54		54-57
Zn	55-58		64-67
Cr	59-61		48-50
Ni	62-65		74-77
Mo	66-68		58-60
Co	69-71		78-80
Bi	72-74		68-70
Cd	75-77		61-63
Sb	78-80		71-73

Gang punch laboratory in 29-30

Sec = 00
Ket = 01

Gang punch + on columns 1, 10, 30, 40, 50, 60, 70, 80

APPENDIX C

NATIONAL AIR SAMPLING NETWORK NAME CARDS

Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5, 6 City No. Cols. 7, 8, 9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	City Numbers to	City	City Number	Population Class	Topographic Class
I	Connecticut	01	001	020	Waterbury	001	5	0
					New Britain	002	6	0
					Hartford	003	5	0
					New Haven	004	5	0
					Stamford	005	6	0
					Bridgeport	006	5	0
						007		
						008		
						009		
						010		
						011		
						012		
						013		
						014		
						015		
						016		
						017		
						018		
						019		
	(Litchfield County)				Nonurban	020	0	4
I	Maine	02	021	030	Portland	021	6	0
						022		
						023		
						024		
						025		
						026		
						027		
						028		
						029		
	(Acadia National Park)				Nonurban	030	0	2

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
I	Massachusetts	03	031	080	Boston	031	3	0
					Pittsfield	032	6	0
					Middlesex Co.	033	9	0
					Everett	034	7	0
					Lawrence	035	6	0
					Lynn	036	6	0
					Somerville	037	5	0
					Worcester	038	5	0
					Brockton	039	6	0
					Fall River	040	5	0
					Quincy	041	6	0
					Springfield	042	5	0
					Cambridge	043	5	0
					Lowell	044	6	0
					New Bedford	045	5	0
						046		
						047		
						048		
						049		
						050		
						051		
						052		
						053		
						054		
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						069		
						070		
						071		
						072		
						073		
						074		
						075		
						076		
						077		
						078		
						079		
		(Nantucket)			Nonurban	080	0	2

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Numbers	Population Class	Topographic Class
I	New Hampshire	04	081	090	Manchester	081	6	0
						082		
						083		
						084		
						085		
						086		
						087		
						088		
						089		
					Nonurban	090	0	5
I	Rhode Island	05	091	100	Providence	091	5	0
						092		
						093		
						094		
						095		
						096		
						097		
						098		
						099		
	(Washington County)				Nonurban	100	0	4
I	Vermont	06	101	110	Burlington	101	7	0
						102		
						103		
						104		
						105		
						106		
						107		
						108		
						109		
	(Lamoille County)				Nonurban	110	0	8
II	Delaware	07	111	120	Wilmington	111	5	0
						112		
						113		
						114		
						115		
						116		
						117		
						118		
						119		
	(Kent County)				Nonurban	120	0	4

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
II	New Jersey	08	121	165	Atlantic City	121	6	0
					Hightstown	122	9	0
					Glen Gardner	123	9	0
					Red Bank	124	8	0
					Lakehurst	125	9	0
					Elizabeth	126	5	0
					Paulsboro	127	9	0
					Camden	128	5	0
					Perth Amboy	129	7	0
					Trenton	130	5	0
					Jersey City	131	5	0
					East Orange	132	6	0
					Newark	133	4	0
					Bayonne	134	6	0
					Paterson	135	5	0
						136		
						137		
						138		
						139		
						140		
						141		
						142		
						143		
						144		
						145		
						146		
						147		
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						157		
						158		
						159		
						160		
						161		
						162		
						163		
						164		
		(Cape May)			Nonurban	165	0	2

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	City Numbers to	City	City Number	Population Class	Topographic Class
II	New York	09	166	215	New York	166	1	0
					Binghamton	167	6	0
					Buffalo	168	4	0
					Schenectady	169	6	0
					Syracuse	170	5	0
					Utica	171	5	0
					Albany	172	5	0
					Rochester	173	5	0
					Yonkers	174	5	0
					Niagara Falls	175	6	0
					New Rochelle	176	6	0
					Poughkeepsie	177	7	0
					Troy	178	6	0
					White Plains	179	7	0
					Massena	180	8	0
						181		
						182		
						183		
						184		
						185		
						186		
						187		
						188		
						189		
						190		
						191		
						192		
						193		
						194		
						195		
						196		
						197		
						198		
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						200		
						201		
						202		
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						204		
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						206		
						207		
						208		
						209		
						210		
						211		
						212		
						213		
						214		
	(Cape Vincent)				Nonurban	215	0	6

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
II	Pennsylvania	10	216	255	Philadelphia	216	2	0
					Altoona	217	6	0
					Bristol	218	8	0
					Chester	219	6	0
					Erie	220	5	0
					Pittsburgh	221	4	0
					Williamsport	222	7	0
					Allentown	223	5	0
					Johnstown	224	6	0
					Lancaster	225	6	0
					Scranton	226	5	0
					Harrisburg	227	6	0
					Reading	228	5	0
					Wilkes-Barre	229	6	0
					York	230	6	0
						231		
						232		
						233		
						234		
						235		
						236		
						237		
						238		
						239		
						240		
						241		
						242		
						243		
						244		
						245		
						246		
						247		
						248		
						249		
						250		
						251		
						252		
						253		
						254		
	(Clarion County)				Nonurban	255	0	8

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. ~~Col.~~ 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
III	District of Columbia	11	256	-	Washington	256	3	0
III	Kentucky	12	257	266	Louisville	257	5	0
						258		
						259		
						260		
						261		
						262		
						263		
						264		
						265		
	(Pulaski County)				Nonurban	266	0	8
III	Maryland	13	267	276	Baltimore	267	3	0
					Pocomoke City	268	9	0
						269		
						270		
						271		
						272		
						273		
						274		
						275		
	(Calvert County)				Nonurban	276	0	4
III	North Carolina	14	277	296	Charlotte	277	5	0
					Winston-Salem	278	6	0
					Asheville	279	6	0
					Greensboro	280	6	0
					Raleigh	281	6	0
					Gastonia	282	7	0
						283		
						284		
						285		
						286		
						287		
						288		
						289		
						290		
						291		
						292		
						293		
						294		
						295		
	(Cape Hatteras)				Nonurban	296	0	2

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
III	Puerto Rico	15	297	311	San Juan	297	5	0
						298		
						299		
						300		
						301		
						302		
						303		
						304		
						305		
						306		
						307		
						308		
						309		
						310		
	(Loquillo Mountains)				Nonurban	311	0	5
III	Virginia	16	312	326	Norfolk	312	5	0
					Richmond	313	5	0
					Hampton	314	9	0
					Roanoke	315	6	0
						316		
						317		
						318		
						319		
						320		
						321		
						322		
						323		
						324		
						325		
	(Shenandoah National Park)				Nonurban	326	0	5
III	West Virginia	17	327	341	Charleston	327	6	0
					Wheeling	328	6	0
					Huntington	329	6	0
						330		
						331		
						332		
						333		
						334		
						335		
						336		
						337		
						338		
						339		
	(Kanawha County)				Suburban	340	9	0
	(Webster County)				Nonurban	341	0	8

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	City Numbers to	City	City Number	Population Class	Topographic Class
IV	Alabama	18	342	356	Birmingham	342	5	0
					Bessemer	343	7	0
					Mobile	344	5	0
					Montgomery	345	5	0
						346		
						347		
						348		
						349		
						350		
						351		
						352		
						353		
						354		
						355		
	(Baldwin County)				Nonurban	356	0	7
IV	Florida	19	357	381	Tampa	357	5	0
					Miami	358	5	0
					Jacksonville	359	5	0
					Orlando	360	6	0
						361		
						362		
						363		
						364		
						365		
						366		
						367		
						368		
						369		
						370		
						371		
						372		
						373		
						374		
						375		
						376		
						377		
						378		
						379		
	(Hillsborough County)				Suburban	380	9	0
	(Florida Keys)				Nonurban	381	0	2

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Cards

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
IV	Georgia	20	382	401	Atlanta	382	5	0
					Columbus	383	6	0
					Augusta	384	6	0
					Macon	385	6	0
					Savannah	386	5	0
						387		
						388		
						389		
						390		
						391		
						392		
						393		
						394		
						395		
						396		
						397		
						398		
						399		
	(Fulton County)				Suburban	400	9	0
	(Chatham County)				Nonurban	401	0	2
IV	Mississippi	21	402	411	Jackson	402	6	0
						403		
						404		
						405		
						406		
						407		
						408		
						409		
						410		
	(Jackson County)				Nonurban	411	0	7
IV	South Carolina	22	412	421	Columbia	412	6	0
					Greenville	413	6	0
					Charleston	414	6	0
						415		
						416		
						417		
						418		
						419		
						420		
					Nonurban	421	0	4

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
IV	Tennessee	23	422	436	Chattanooga	422	5	0
					Knoxville	423	5	0
					Nashville	424	5	0
					Memphis	425	5	0
						426		
						427		
						428		
						429		
						430		
						431		
						432		
						433		
						434		
						435		
	(Stewart County)				Nonurban	436	0	4

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
V	Illinois	24	437	480	Chicago	437	1	0
					East St. Louis	438	6	0
					Springfield	439	6	0
					Peoria	440	5	0
					Rockford	441	5	0
						442		
						443		
						444		
						445		
						446		
						447		
						448		
						449		
						450		
						451		
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						466		
						467		
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						469		
						470		
						471		
						472		
						473		
						474		
						475		
						476		
						477		
						478		
						479		
	(Sangamon County)				Nonurban	480	0	4

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	City Numbers to	City	City Number	Population Class	Topographic Class
V	Indiana	25	481	505	East Chicago	481	6	0
					Evansville	482	5	0
					Fort Wayne	483	5	0
					Indianapolis	484	4	0
					Gary	485	5	0
					Terre Haute	486	6	0
					Hammond	487	6	0
					South Bend	488	5	0
						489		
						490		
						491		
						492		
						493		
						494		
						495		
						496		
						497		
						498		
						499		
						500		
						501		
						502		
						503		
						504		
	(Montgomery County)				Nonurban	505	0	4

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
V	**Michigan**	**26**	**506**	**540**	**Detroit**	506	2	0
					Dearborn	507	6	0
					Grand Rapids	508	5	0
					Kalamazoo	509	6	0
					Lansing	510	6	0
					Flint	511	5	0
					Jackson	512	6	0
					Saginaw	513	6	0
						514		
						515		
						516		
						517		
						518		
						519		
						520		
						521		
						522		
						523		
						524		
						525		
						526		
						527		
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						529		
						530		
						531		
						532		
						533		
						534		
						535		
						536		
						537		
						538		
						539		
	(Huron County)				Nonurban	540	0	6

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
V	Ohio	27	541	590	Cincinnati	541	4	0
					St. Bernard	542	9	0
					Youngstown	543	5	0
					Canton	544	5	0
					Cleveland	545	3	0
					Columbus	546	5	0
					Toledo	547	5	0
					Lorain	548	6	0
					Akron	549	5	0
					Dayton	550	5	0
					Springfield	551	6	0
					Hamilton	552	6	0
						553		
						554		
						555		
						556		
						557		
						558		
						559		
						560		
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						562		
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						581		
						582		
						583		
						584		
						585		
						586		
						587		
						588		
	(Hamilton County)				Suburban	589	9	0
	(South Bass Island)				Nonurban	590	0	6

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	City Numbers to	City	City Number	Population Class	Topographic Class
V	Wisconsin	28	591	615	Milwaukee	591	4	0
					Racine	592	6	0
					Madison	593	6	0
						594		
						595		
						596		
						597		
						598		
						599		
						600		
						601		
						602		
						603		
						604		
						605		
						606		
						607		
						608		
						609		
						610		
						611		
						612		
						613		
						614		
	(Door County)				Nonurban	615	0	6

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
VI	Iowa	29	616	635	Des Moines	616	5	0
					Davenport	617	6	0
					Iowa City	618	7	0
						619		
						620		
						621		
						622		
						623		
						624		
						625		
						626		
						627		
						628		
						629		
						630		
						631		
						632		
						633		
						634		
	(Clayton County)				Nonurban	635	0	4
VI	Kansas	30	636	650	Kansas City	636	5	0
					Wichita	637	5	0
					Topeka	638	6	0
						639		
						640		
						641		
						642		
						643		
						644		
						645		
						646		
						647		
						648		
						649		
	(Ellis County)				Nonurban	650	0	4
VI	Minnesota	31	651	660	Minneapolis	651	4	0
					Tonka Bay	652	9	0
					Edina	653	9	0
					Duluth	654	5	0
					St. Paul	655	5	0
						656		
						657		
						658		
						659		
	(Cook County)				Nonurban	660	0	6

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4　State No. Cols. 5,6　City No. Cols. 7,8,9
Population Class No. Col. 12　Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	City Numbers to	City	City Number	Population Class	Topographic Class
VI	Missouri	32	661	675	Kansas City	661	4	0
					St. Louis	662	3	0
					Warson Woods	663	9	0
					Brentwood	664	9	0
					Breckenridge	665	9	0
					Jefferson City	666	7	0
						667		
						668		
						669		
						670		
						671		
						672		
						673		
						674		
	(Shannon County)				Nonurban	675	0	5
VI	Nebraska	33	676	685	Omaha	676	5	0
					Lincoln	677	6	0
						678		
						679		
						680		
						681		
						682		
						683		
						684		
	(Thomas County)				Nonurban	685	0	4
VI	North Dakota	34	686	695	Bismarck	686	8	0
						687		
						688		
						689		
						690		
						691		
						692		
						693		
						694		
	(Ward County)				Nonurban	695	0	4

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
VI	South Dakota	35	696	705	Sioux Falls	696	6	0
					Pierre	697	9	0
						698		
						699		
						700		
						701		
						702		
						703		
						704		
	(Black Hills Forest)				Nonurban	705	0	5
VII	Arkansas	36	706	715	Little Rock	706	5	0
						707		
						708		
						709		
						710		
						711		
						712		
						713		
						714		
	(Montgomery County)				Nonurban	715	0	5
VII	Louisiana	37	716	730	New Orleans	716	4	0
					Baton Rouge	717	5	0
					Shreveport	718	5	0
						719		
						720		
						721		
						722		
						723		
						724		
						725		
						726		
						727		
						728		
						729		
					Nonurban	730	0	7

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
VII	New Mexico	38	731	740	Albuquerque	731	6	0
					Santa Fe	732	7	0
						733		
						734		
						735		
						736		
						737		
						738		
						739		
	(Colfax County)				Nonurban	740	0	8
VII	Oklahoma	39	741	755	Tulsa	741	5	0
					Oklahoma City	742	5	0
						743		
						744		
						745		
						746		
						747		
						748		
						749		
						750		
						751		
						752		
						753		
						754		
	(Comanche County)				Nonurban	755	0	4

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
VII	Texas	40	756	800	Ft. Worth	756	5	0
					Lake Worth	757	9	0
					Houston	758	4	0
					Bellaire	759	8	0
					Dallas	760	4	0
					San Antonio	761	4	0
					El Paso	762	5	0
					Corpus Christi	763	5	0
					Austin	764	5	0
					Waco	765	6	0
					Beaumont	766	6	0
					Galveston	767	6	0
						768		
						769		
						770		
						771		
						772		
						773		
						774		
						775		
						776		
						777		
						778		
						779		
						780		
						781		
						782		
						783		
						784		
						785		
						786		
						787		
						788		
						789		
						790		
						791		
						792		
						793		
						794		
						795		
						796		
						797		
						798		
						799		
	(Calhoun County)				Nonurban	800	0	7

NATIONAL AIR SAMPLING NETWORK NAME CARDS
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Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
VIII	Colorado	41	801	810	Denver	801	4	0
						802		
						803		
						804		
						805		
						806		
						807		
						808		
	(Denver County)				Suburban	809	9	0
	(Montezuma County)				Nonurban	810	0	8
VIII	Idaho	42	811	820	Boise	811	7	0
						812		
						813		
						814		
						815		
						816		
						817		
						818		
						819		
	(Butte County)				Nonurban	820	0	3
VIII	Montana	43	821	830	Helena	821	8	0
						822		
						823		
						824		
						825		
						826		
						827		
						828		
						829		
	(Glacier National Park)				Nonurban	830	0	8
VIII	Utah	44	831	840	Salt Lake City	831	5	0
						832		
						833		
						834		
						835		
						836		
						837		
						838		
	(Salt Lake County)				Suburban	839	9	0
	(Bryce Canyon Park)				Nonurban	840	0	3

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
VIII	Wyoming	45	841	850	Cheyenne	841	7	0
						842		
						843		
						844		
						845		
						846		
						847		
						848		
						849		
	(Yellowstone Park)				Nonurban	850	0	8
IX	Alaska	46	851	860	Anchorage	851	8	0
					Juneau	852	9	0
						853		
						854		
						855		
						856		
						857		
						858		
						859		
	(Pt. Woronzof)				Nonurban	860	0	5
IX	Arizona	47	861	870	Phoenix	861	5	0
						862		
						863		
						864		
						865		
						866		
						867		
						868		
						869		
	(Grand Canyon Park)				Nonurban	870	0	3

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
IX	California	48	871	950	Los Angeles	871	2	0
					San Francisco	872	3	0
					Pasadena	873	5	0
					Berkeley	874	5	0
					San Jose	875	5	0
					San Leandro	876	7	0
					Santa Monica	877	6	0
					San Diego	878	4	0
					Burbank	879	6	0
					San Bernardino	880	6	0
					Fresno	881	5	0
					Oakland	882	5	0
					Sacramento	883	5	0
					Long Beach	884	5	0
					Richmond	885	6	0
					Stockton	886	6	0
					Glendale	887	6	0
						888		
						889		
						890		
						891		
						892		
						893		
						894		
						895		
						896		
						897		
						898		
						899		
						900		
						901		
						902		
						903		
						904		
						905		
						906		
						907		
						908		
						909		
						910		
						911		
						912		
						913		
						914		
						915		

(Continued)

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
IX	California (continued)					916		
						917		
						918		
						919		
						920		
						921		
						922		
						923		
						924		
						925		
						926		
						927		
						928		
						929		
						930		
						931		
						932		
						933		
						934		
						935		
						936		
						937		
						938		
						939		
						940		
						941		
						942		
						943		
						944		
						945		
						946		
						947		
						948		
						949		
	(Humboldt County)				Nonurban	950	0	9
IX	Hawaii	49	951	960	Honolulu	951	5	0
						952		
						953		
						954		
						955		
						956		
						957		
						958		
	(Barbers Point, Ewa)				Nonurban	959	0	9
	(Waimanalo)				Nonurban	960	0	9

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
IX	Nevada	50	961	970	Las Vegas	961	7	0
						962		
						963		
						964		
						965		
						966		
						967		
						968		
						969		
	(White Pine County)				Nonurban	970	0	3
IX	Oregon	51	971	980	Portland	971	5	0
					Klamath Falls	972	8	0
						973		
						974		
						975		
						976		
						977		
						978		
	(Multnomah County)				Suburban	979	9	0
	(Curry County)				Nonurban	980	0	9
IX	Washington	52	981	999	Seattle	981	4	0
					Tacoma	982	5	0
					Spokane	983	5	0
						984		
						985		
						986		
						987		
						988		
						989		
						990		
						991		
						992		
						993		
						994		
						995		
						996		
						997		
	(Clallam County)				Nonurban	998	0	9

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

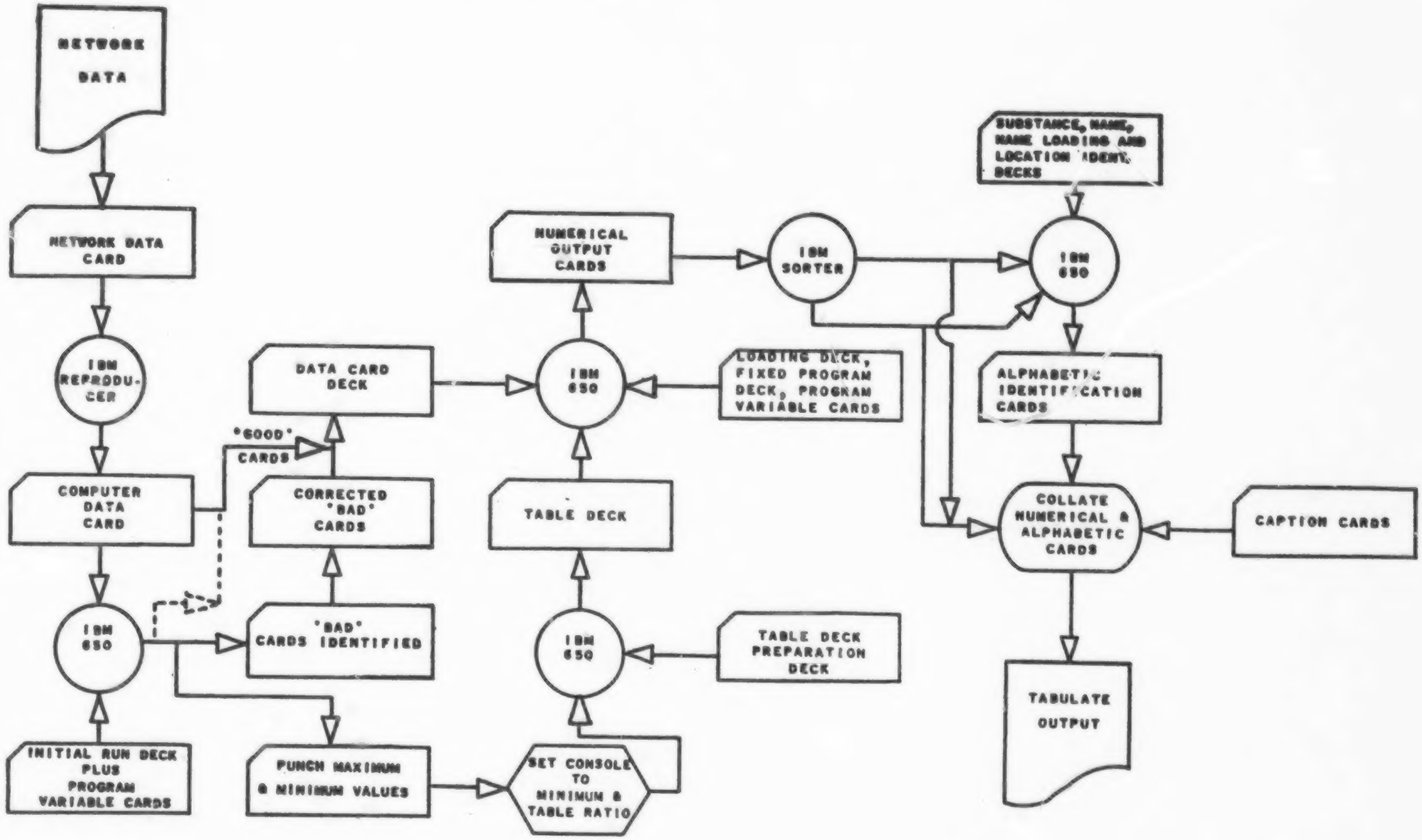
Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
IX	California (continued)					916		
						917		
						918		
						919		
						920		
						921		
						922		
						923		
						924		
						925		
						926		
						927		
						928		
						929		
						930		
						931		
						932		
						933		
						934		
						935		
						936		
						937		
						938		
						939		
						940		
						941		
						942		
						943		
						944		
						945		
						946		
						947		
						948		
						949		
	(Humboldt County)				Nonurban	950	0	9
IX	Hawaii	49	951	960	Honolulu	951	5	0
						952		
						953		
						954		
						955		
						956		
						957		
						958		
	(Barbers Point, Ewa)				Nonurban	959	0	9
	(Waimanalo)				Nonurban	960	0	9

NATIONAL AIR SAMPLING NETWORK NAME CARDS
Region, State and City IBM Code

Region No. Col. 4 State No. Cols. 5,6 City No. Cols. 7,8,9
Population Class No. Col. 12 Topographic Class No. Col. 13

Region Number	State	State Number	City Numbers from	to	City	City Number	Population Class	Topographic Class
IX	Nevada	50	961	970	Las Vegas	961	7	0
						962		
						963		
						964		
						965		
						966		
						967		
						968		
						969		
	(White Pine County)				Nonurban	970	0	3
IX	Oregon	51	971	980	Portland	971	5	0
					Klamath Falls	972	8	0
						973		
						974		
						975		
						976		
						977		
						978		
	(Multnomah County)				Suburban	979	9	0
	(Curry County)				Nonurban	980	0	9
IX	Washington	52	981	999	Seattle	981	4	0
					Tacoma	982	5	0
					Spokane	983	5	0
						984		
						985		
						986		
						987		
						988		
						989		
						990		
						991		
						992		
						993		
						994		
						995		
						996		
						997		
	(Clallam County)				Nonurban	998	0	9


NETWORK DATA
NETWORK DATA CARD
IBM REPRODU-CER
COMPUTER DATA CARD
IBM 650
INITIAL RUN DECK PLUS PROGRAM VARIABLE CARDS
'GOOD' CARDS
DATA CARD DECK
CORRECTED 'BAD' CARDS
'BAD' CARDS IDENTIFIED
PUNCH MAXIMUM & MINIMUM VALUES
IBM 650
LOADING DECK, FIXED PROGRAM DECK, PROGRAM VARIABLE CARDS
NUMERICAL OUTPUT CARDS
TABLE DECK
IBM 650
TABLE DECK PREPARATION DECK
SET CONSOLE TO MINIMUM & TABLE RATIO
IBM SORTER
SUBSTANCE, NAME, NAME LOADING AND LOCATION IDENT. DECKS
IBM 650
ALPHABETIC IDENTIFICATION CARDS
COLLATE NUMERICAL & ALPHABETIC CARDS
CAPTION CARDS
TABULATE OUTPUT

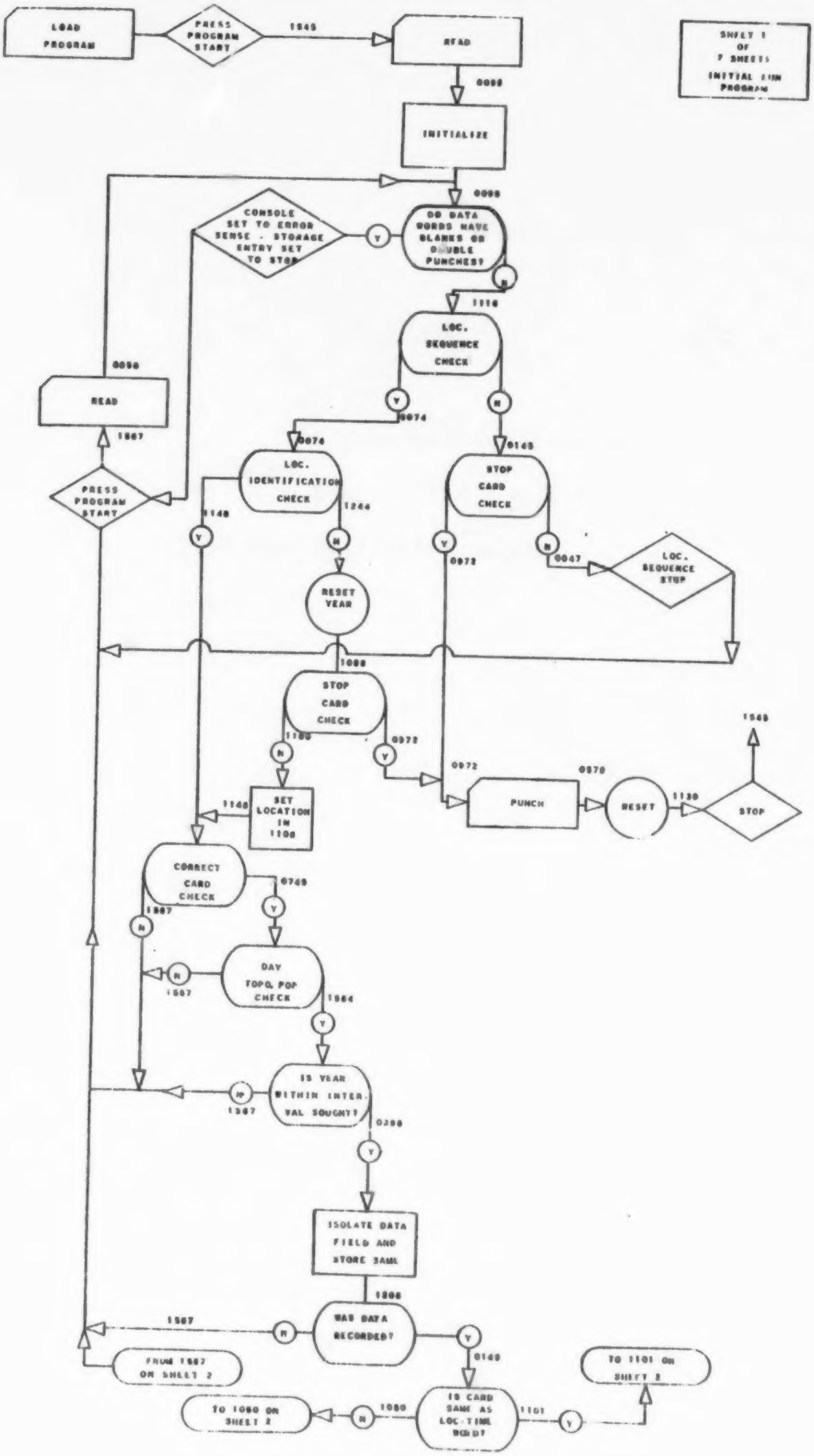
NASN PROGRAM FLOW

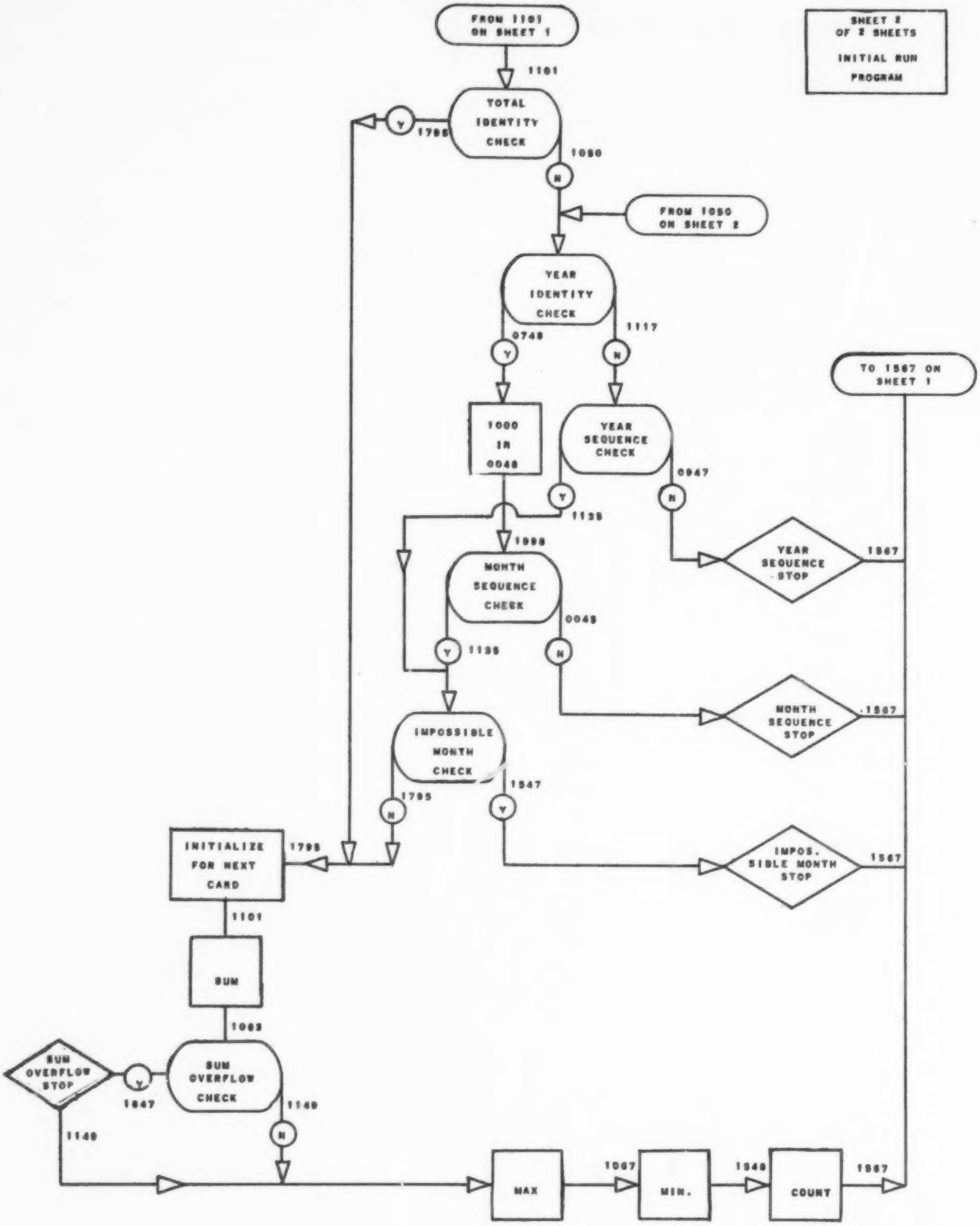
APPENDIX E

Initial Run Program

  Flow Chart

  Single Instruction Load Cards


SHEET 1
OF
7 SHEETS
INITIAL RUN
PROGRAM
LOAD PROGRAM
PRESS PROGRAM START
1549
READ
0098
INITIALIZE
0098
DO DATA WORDS HAVE BLANKS OR DOUBLE PUNCHES?
Y
N
CONSOLE SET TO ERROR SENSE - STORAGE ENTRY SET TO STOP
1116
LOC. SEQUENCE CHECK
Y
0074
N
0148
0074
LOC. IDENTIFICATION CHECK
1148
Y
1244
N
RESET YEAR
0056
READ
1567
PRESS PROGRAM START
STOP CARD CHECK
Y
0072
N
0047
LOC. SEQUENCE STOP
1088
STOP CARD CHECK
1180
N
0072
Y
1148
SET LOCATION IN 1108
0072
PUNCH
0070
RESET
1130
STOP
1549
CORRECT CARD CHECK
0749
Y
1567
N
DAY TOPO, POP CHECK
N
1567
1584
Y
IS YEAR WITHIN INTERVAL SOUGHT?
N
1567
0398
Y
ISOLATE DATA FIELD AND STORE SAME
1206
WAS DATA RECORDED?
1567
N
Y
0148
FROM 1567 ON SHEET 2
IS CARD SAME AS LOC-TIME WORD?
1080
N
TO 1080 ON SHEET 2
1101
Y
TO 1101 ON SHEET 2


SHEET 2
OF 2 SHEETS
INITIAL RUN
PROGRAM
FROM 1101
ON SHEET 1
1101
TOTAL
IDENTITY
CHECK
Y
1795
1050
N
FROM 1050
ON SHEET 2
YEAR
IDENTITY
CHECK
0748
Y
1117
N
TO 1567 ON
SHEET 1
1000
IN
0048
YEAR
SEQUENCE
CHECK
Y
1135
0947
N
1998
YEAR
SEQUENCE
STOP
1567
MONTH
SEQUENCE
CHECK
0045
Y
1135
N
MONTH
SEQUENCE
STOP
1567
IMPOSSIBLE
MONTH
CHECK
1795
N
1547
Y
IMPOS.
SIBLE MONTH
STOP
1567
INITIALIZE
FOR NEXT
CARD
1795
1101
SUM
1063
SUM
OVERFLOW
STOP
Y
1547
SUM
OVERFLOW
CHECK
1149
N
1149
MAX
1067
MIN.
1548
COUNT
1567

NASN INITIAL RUN PROGRAM **PAGE 1 of 3 PAGES**

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1545	70	0096	0096	
0096	69	0051	0158	
0158	24	1108	0098	
0098	60	0053	1116	
1116	60	0054	0021	
0021	60	0055	0026	
0026	60	0056	0031	
0031	60	0057	0036	
0036	60	0058	0243	
0243	60	0051	0574	
0574	15	1108	0982	
0982	35	0003	0348	
0348	11	8002	1670	
1670	46	0145	0074	
0145	65	0052	0245	
0245	35	0001	1450	
1450	44	0047	0972	
0047	01	1991	1567	
1567	70	0098	0098	
0074	60	0051	0069	
0069	11	1108	0448	
0448	35	0003	1682	
1682	44	1244	1148	
1244	20	0048	1098	
1098	67	0052	1094	
1094	35	0001	1494	
1494	44	1100	0972	
0972	71	1077	0579	
0579	21	1077	0672	
0672	21	1078	0557	
0557	21	1080	0594	
0594	69	1231	1029	
1029	24	1079	1130	
1130	01	1997	1545	
1100	60	0051	0769	
0769	35	0003	0281	
0281	30	0003	1769	
1769	21	1108	1148	
1148	67	0052	1572	
1572	35	0001	0698	
0698	11	0374	1044	
0374	00	0000	000*	Mandatory Card
1044	44	1567	0749	
0749	65	1454	1659	
1454	**	* * *0	0000	Mandatory Card
1659	35	0001	1565	
1565	21	1570	1573	
1573	11	8003	1031	
1031	35	0001	0295	
0295	21	0550	1856	
1856	11	8003	1665	
1665	35	0001	0173	
0173	21	0079	1783	
1783	67	0052	0857	
0857	35	0001	1663	
1663	11	8003	1874	
1874	35	0001	0182	
0182	21	1796	0599	
0599	11	8003	0757	
0757	35	0001	1763	
1763	21	1568	1674	
1674	60	1570	1575	
1575	44	0383	1884	
0383	11	1144	0949	
0949	44	1657	1658	To 1657 and 1658 page 2
1884	67	0052	1557	
1557	20	1563	1866	
1866	60	0550	1858	
1858	44	0958	1459	

NASN INITIAL RUN PROGRAM **PAGE 2 of 3 PAGES**

LOCATION	OPERATGON	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1657	65	0052	1757	
1757	46	1884	1765	To 1884 page 1
1658	65	0052	1758	
1758	46	1236	1557	To 1557 page 1
0958	11	1796	1559	
1559	44	1567	1459	
1459	60	0079	1684	
1684	44	1041	1042	
1765	20	1563	1567	To 1567 page 1
1236	67	0052	1765	
1041	11	1144	1049	
1049	44	1759	1560	
1042	60	1568	0049	
0049	44	1567	1564	To 1567 page 1
1759	10	8001	1668	
1668	11	1568	0049	
1560	60	1796	0049	
1564	60	1563	1348	
1348	15	0051	1774	
1774	35	0001	0482	
0482	16	8002	0598	
0598	30	0002	1189	
1189	20	1000	1797	
1797	60	0050	0956	
0050	* *	0000	0000	Mandatory Card
0956	11	1000	1748	
1748	46	1567	1848	
1848	60	8001	1948	
1948	11	0863	1850	
0863	* *	0000	0000	Mandatory Card
1850	46	1567	~~0398~~ 1598	
~~0398~~ 1598	67	005*	1997	Operation Cards
~~0398~~ 1598	65	0053	0043	
0043	46	1567	1997	To 1567 page 1
0043	46	0143	1567	To 1567 page 1
0143	67	0053	1997	
1997	35	000*	1550	
1997	35	000*	0944	
0944	11	8003	1344	
1344	35	000*	1550	
1550	21	1009	1206	
1206	60	1009	0266	
0266	11	1876	1584	
1584	44	0149	1567	To 1567 page 2
0149	60	0051	1105	
1105	11	1108	1113	
1113	44	1050	1795	To 1795 page 3
1050	65	1108	0280	
0280	35	0001	1696	
1696	21	0150	0648	
0648	65	0051	1163	
1163	35	0001	1282	
1282	16	8002	1345	
1345	11	0150	1169	
1169	44	1117	0748	
1117.	60	1000	1022	
1022	11	0048	1555	
1555	46	0947	1135	
0947	01	1992	1567	To 1567 page 1
0748	69	1000	0898	
0898	24	0048	1998	
1998	60	0051	1133	
1133	11	1108	0874	
0874	46	0045	1135	
0045	01	1993	1567	To 1567 page 1
1135	65	0051	100[illegible]	
1005	35	0001	1161	
1161	11	8003	1069	
1069	35	0002	1129	
1129	16	8002	1355	

NASN INITIAL RUN PROGRAM

PAGE 3 of 3 PAGES

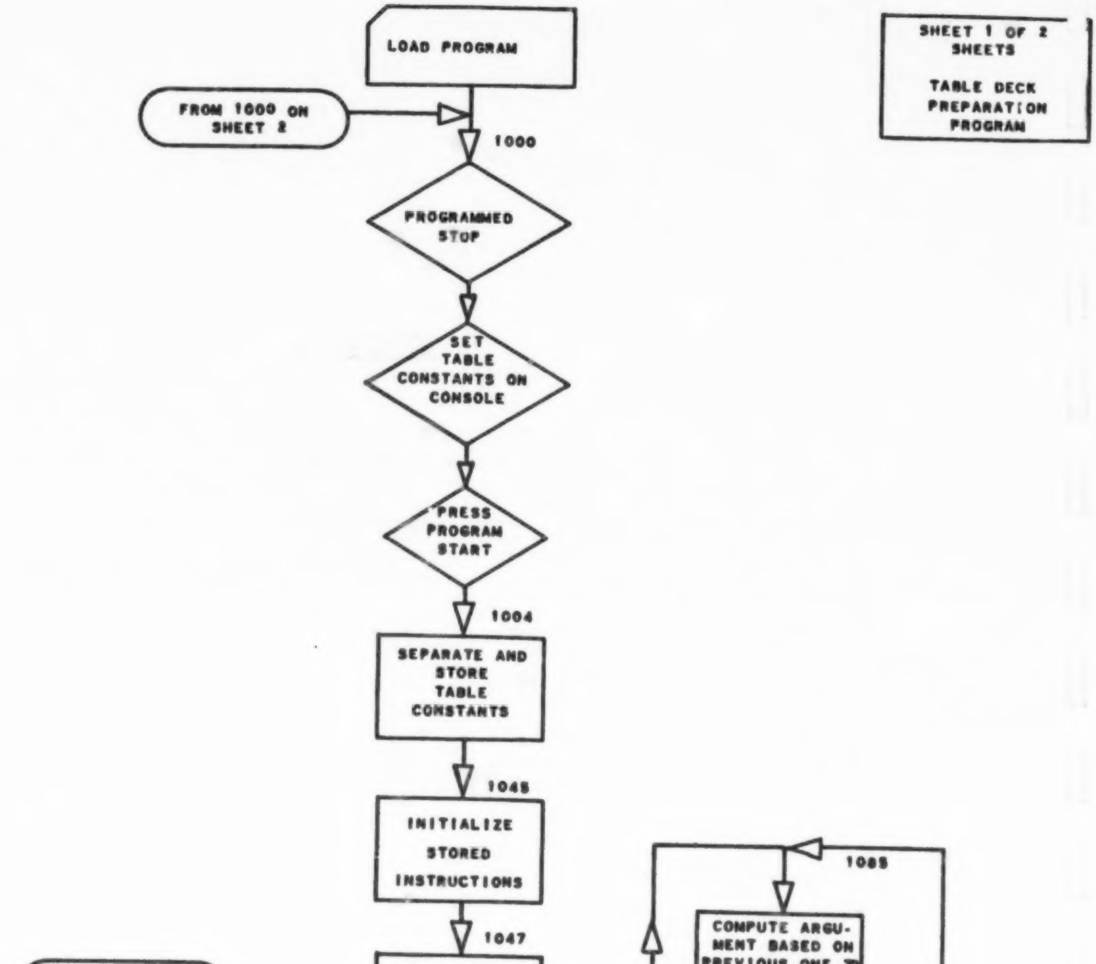
LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1355	44	1137	1547	
1547	01	1994	1567	To 1567 page 2
1137	15	1650	1145	
1145	11	8003	1672	
1672	16	8001	1103	
1103	46	1547	1795	
1795	69	0051	0556	
0556	24	1108	1101	
1101	65	1077	1143	
1143	15	1009	1063	
1063	44	1647	1149	
1647	01	1995	1149	
1149	20	1077	1091	
1091	60	1078	1203	
1203	11	1009	1013	
1013	46	1066	1067	
1066	24	1078	1067	
1067	60	1079	1193	
1193	11	1009	1863	
1863	46	1548	1217	
1217	24	1079	1548	
1548	60	1080	1199	
1199	10	1144	1150	
1150	21	1080	1567	To 1567 page 1
1231	99	9999	9999	Constants
1650	00	0000	0012	
1144	00	0000	0001	
1079	99	9999	9999	
1086	88	0000	0000	
1744	67	0053	1844	
1844	35	0008	1644	
1644	11	8003	1544	
1544	16	1645	1444	
1444	45	1567	0749	

APPENDIX F

Table Preparation

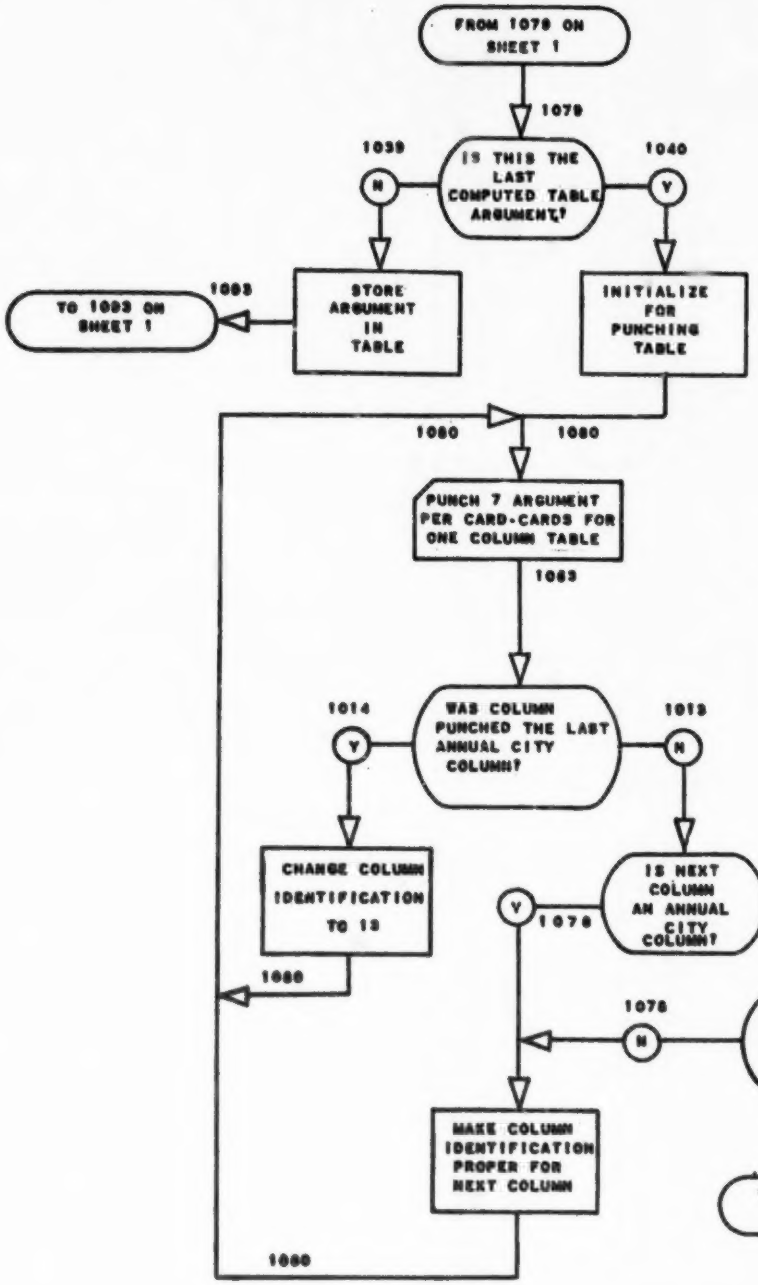
Flow Chart

Single Instruction Load Cards


SHEET 1 OF 2 SHEETS
TABLE DECK PREPARATION PROGRAM
LOAD PROGRAM
FROM 1000 ON SHEET 2
1000
PROGRAMMED STOP
SET TABLE CONSTANTS ON CONSOLE
PRESS PROGRAM START
1004
SEPARATE AND STORE TABLE CONSTANTS
1045
INITIALIZE STORED INSTRUCTIONS
1047
STORE NINES AS LAST TABLE AUGUMENT
1030
PREPARE FIRST TABLE ARGUMENT
FROM 1093 ON SHEET 2
1093
IS ARGUMENT LARGE ENOUGH TO AVOID INTEGER DUPLICATION?
Y
1084
N
1085
COMPUTE ARGUMENT BASED ON PREVIOUS ONE AS AN INTEGER.
1085
COMPUTE ARGUMENT BASED ON PREVIOUS ONE TO THREE DECIMAL PLACES
1075
STORE COMPUTED ARGUMENT TO THREE DECIMAL PLACES
1044
ROUND OFF TO AN INTEGER
1006
IS ARGUMENT THE SAME INTEGER AS PRECEEDING ONE?
Y
N
1094
1079
STORE THE ARGUMENT AS AN INTEGER
TO 1079 ON SHEET 2

SHEET 2
OF 2 SHEETS

TABLE DECK
PREPARATION
PROGRAM


FROM 1079 ON SHEET 1
1079
1039
IS THIS THE LAST COMPUTED TABLE ARGUMENT?
1040
N
Y
STORE ARGUMENT IN TABLE
INITIALIZE FOR PUNCHING TABLE
1093
TO 1093 ON SHEET 1
1080
1080
PUNCH 7 ARGUMENT PER CARD-CARDS FOR ONE COLUMN TABLE
1063
1014
WAS COLUMN PUNCHED THE LAST ANNUAL CITY COLUMN?
1013
Y
N
CHANGE COLUMN IDENTIFICATION TO 13
IS NEXT COLUMN AN ANNUAL CITY COLUMN?
1068
Y
1079
N
1080
1076
N
WAS COLUMN PUNCHED THE LAST COLUMN?
1071
Y
MAKE COLUMN IDENTIFICATION PROPER FOR NEXT COLUMN
TO 1000 ON SHEET 1
1080

NASN TABLE PREPARATION PROGRAM

PAGE 1 of 2 PAGES

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1000	01	1999	1004	
1004	65	8000	1011	
1011	35	0002	1017	
1017	21	1522	1025	
1025	11	8001	1033	
1033	35	0004	1043	
1043	21	1548	1001	
1001	11	8001	1009	
1009	35	0004	1019	
1019	21	1524	1027	
1027	60	1522	1077	
1077	35	0004	1037	
1037	21	1542	1045	
1045	10	1549	1054	
1054	24	1523	1026	
1026	21	1531	1034	
1034	65	1537	1041	
1041	15	1542	1047	
1047	10	1525	8002	
1030	60	1548	1003	
1003	35	0005	1015	
1015	21	0000	1005	
1005	21	1526	1029	
1029	30	0002	1035	
1035	21	1540	1093	
1093	60	1546	1051	
1051	11	1526	1031	
1031	46	1084	1085	
1085	60	1540	1095	
1095	19	1524	1065	
1065	31	0003	1075	
1075	20	1540	1044	
1044	31	0003	1006	
1006	35	0005	1069	
1069	16	1526	1081	
1081	45	1086	1085	
1086	15	8001	1094	
1094	20	1526	1079	
1079	60	1523	1028	
1028	10	1532	1087	
1087	11	1531	1036	
1036	44	1039	1040	
1039	10	8001	1097	
1097	21	1523	1076	
1076	15	1526	8003	
1084	60	8001	1091	
1091	30	0005	1053	
1053	19	1524	1048	
1048	31	0003	1059	
1059	35	0005	1094	
1040	65	1543	1098	
1098	15	1542	1049	
1049	20	1527	1080	
1080	65	1543	1099	
1099	15	1528	1083	
1083	20	1538	1042	
1042	16	1528	1038	
1038	69	1541	1046	
1046	22	1529	1032	

NASN TABLE PREPARATION PROGRAM

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1032	20	1539	1092	
1092	65	1529	1088	
1088	15	1544	1050	
1050	20	1177	1082	
1082	60	1535	1089	
1089	15	1539	8002	
1090	16	1538	1096	
1096	11	8003	1055	
1055	45	1058	1060	
1058	10	8001	1066	
1066	15	1538	1002	
1002	15	1532	1052	
1052	10	8001	8002	
1060	15	1538	1056	
1056	16	1527	1007	
1007	46	1010	1061	
1010	71	1177	1057	
1057	15	8001	1016	
1016	15	1532	1099	
1061	66	8002	1070	
1070	30	0004	1008	
1008	15	1177	1062	
1062	20	1177	1012	
1012	71	1177	1063	
1063	65	1544	1101	
1101	15	1533	1102	
1102	16	1534	1103	
1103	45	1013	1014	
1013	46	1067	1068	
1067	15	8001	1078	
1078	20	1544	1080	
1014	69	1536	1018	
1018	24	1544	1080	
1068	15	3001	1020	
1020	16	1545	1021	
1021	45	1074	1071	
1074	15	8001	1078	
1071	21	1544	1000	**Constants**
1528	00	0006	0000	
1532	00	0001	0000	
1533	00	0100	0000	
1534	00	1000	0000	
1535	24	1178	1090	
1536	00	1300	0000	
1537	21	0000	1030	
1541	00	0000	0007	
1543	69	0000	8003	
1544	00	0000	0000	
1545	00	1900	0000	
1546	00	0190	0000	
1549	20	0000	1093	
1186	88	0000	0000	
1525	99	9990	0000	

APPENDIX G

Fixed Program

- Flow Chart
- Single Instruction Load Cards
- 7 Instructions Per Card Load Routine
- 7 Instruction Per Card -- Fixed Program
- Drum Utilization

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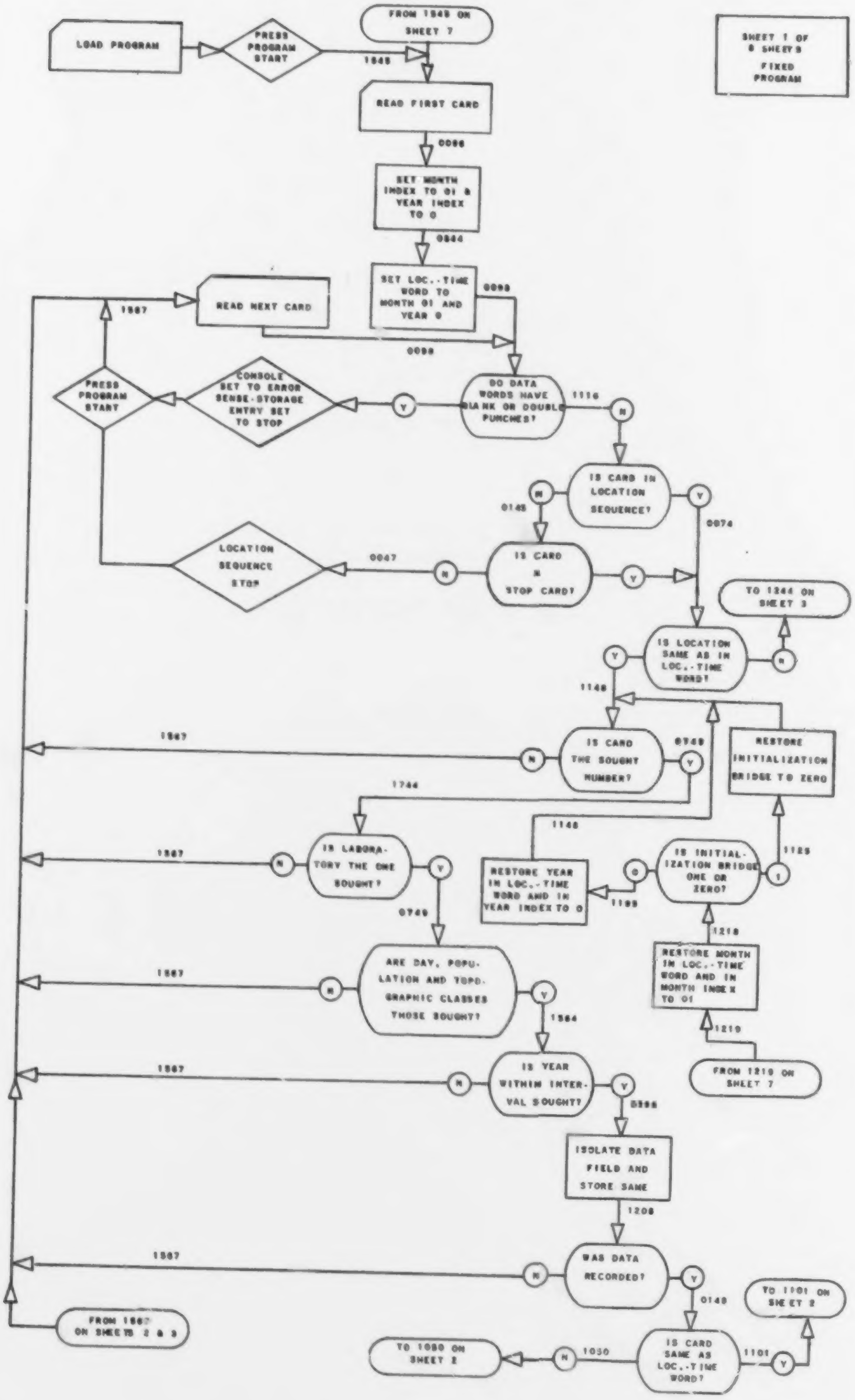
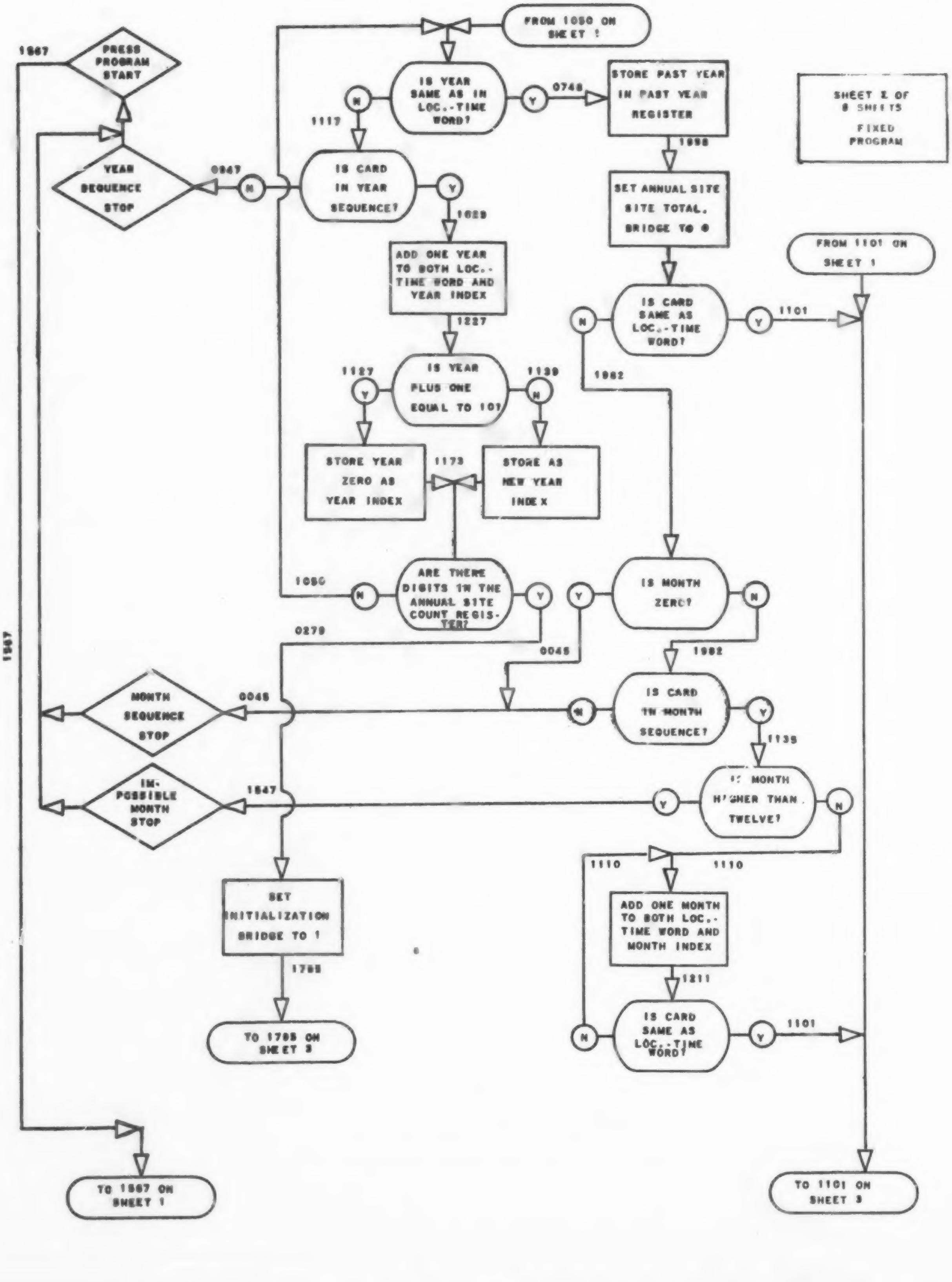
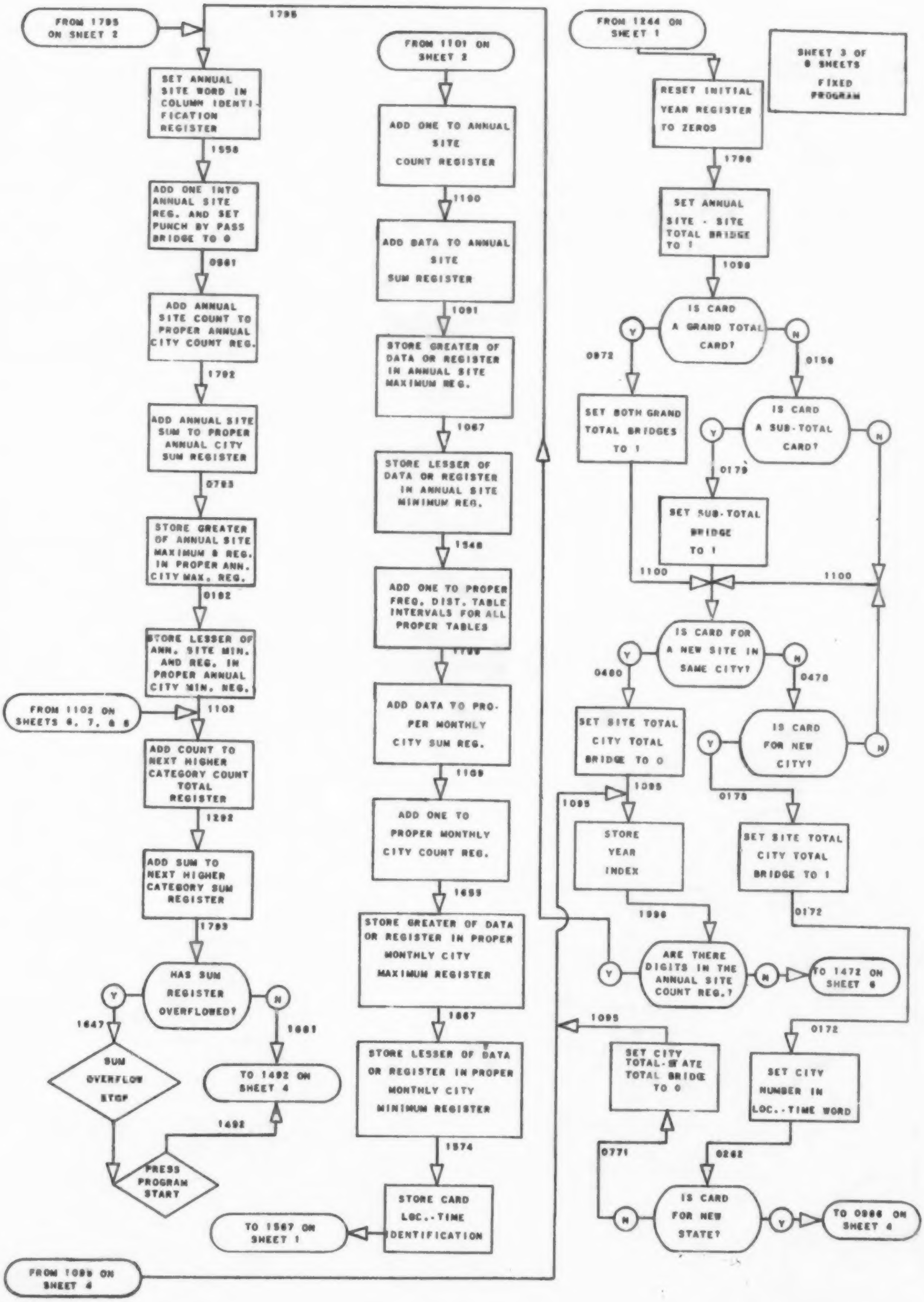
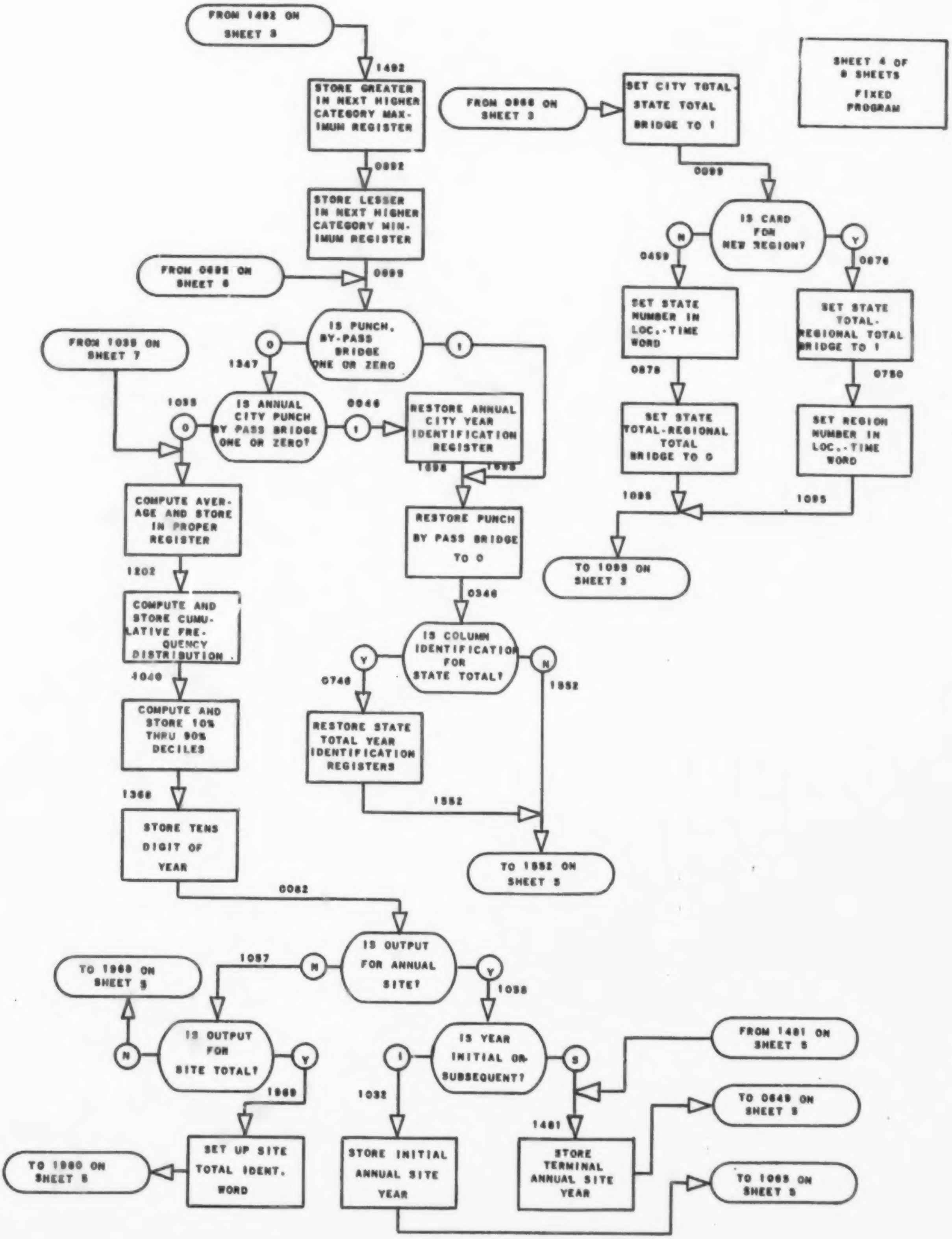
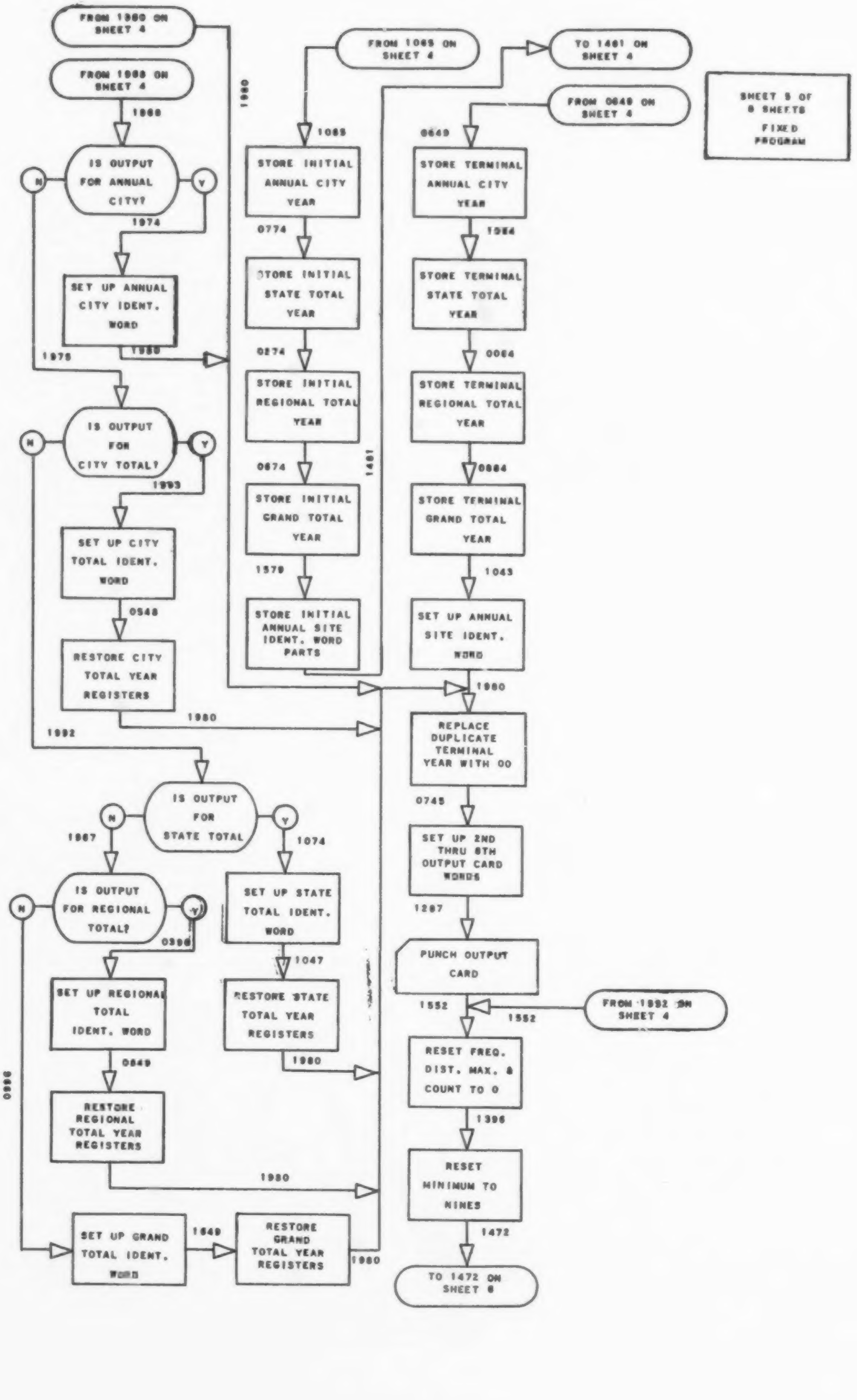
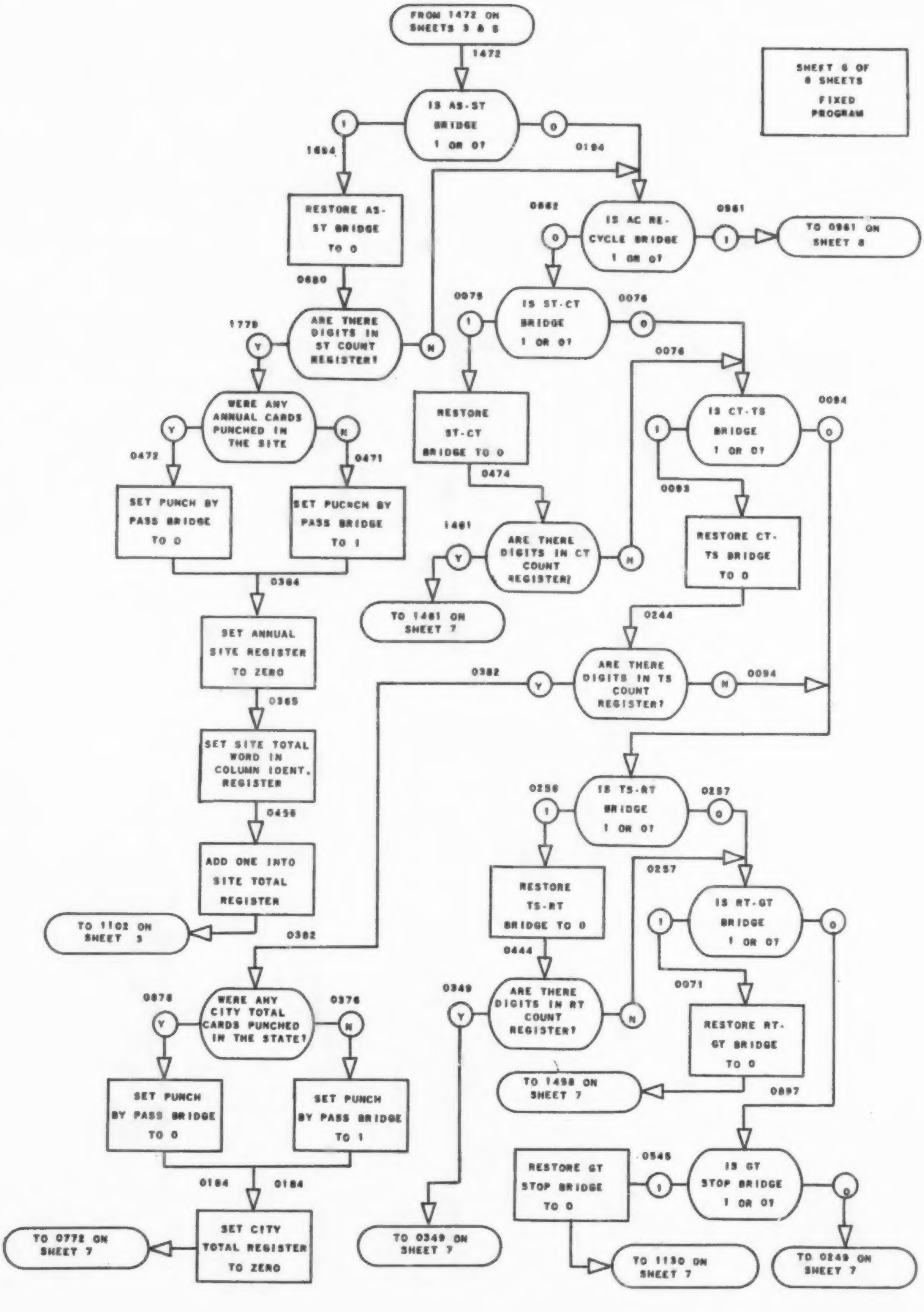

SHEET 1 OF 8 SHEETS
FIXED PROGRAM
LOAD PROGRAM
PRESS PROGRAM START
1545
FROM 1545 ON SHEET 7
READ FIRST CARD
0096
SET MONTH INDEX TO 01 & YEAR INDEX TO 0
0544
SET LOC.-TIME WORD TO MONTH 01 AND YEAR 0
0098
1567
READ NEXT CARD
0098
DO DATA WORDS HAVE BLANK OR DOUBLE PUNCHES?
Y
1116
N
CONSOLE SET TO ERROR SENSE-STORAGE ENTRY SET TO STOP
PRESS PROGRAM START
IS CARD IN LOCATION SEQUENCE?
N
0145
Y
0074
LOCATION SEQUENCE STOP
0047
N
IS CARD N STOP CARD?
Y
TO 1244 ON SHEET 3
IS LOCATION SAME AS IN LOC.-TIME WORD?
Y
N
1148
1567
N
IS CARD THE SOUGHT NUMBER?
0749
Y
RESTORE INITIALIZATION BRIDGE TO ZERO
1744
1148
1567
N
IS LABORATORY THE ONE SOUGHT?
Y
0749
RESTORE YEAR IN LOC.-TIME WORD AND IN YEAR INDEX TO 0
0
1199
IS INITIALIZATION BRIDGE ONE OR ZERO?
1
1125
1218
RESTORE MONTH IN LOC.-TIME WORD AND IN MONTH INDEX TO 01
1219
FROM 1219 ON SHEET 7
1567
N
ARE DAY, POPULATION AND TOPOGRAPHIC CLASSES THOSE SOUGHT?
Y
1564
1567
N
IS YEAR WITHIN INTERVAL SOUGHT?
Y
ISOLATE DATA FIELD AND STORE SAME
1208
1567
N
WAS DATA RECORDED?
Y
0148
TO 1101 ON SHEET 2
FROM 1567 ON SHEETS 2 & 3
TO 1050 ON SHEET 2
N
1050
IS CARD SAME AS LOC.-TIME WORD?
1101
Y

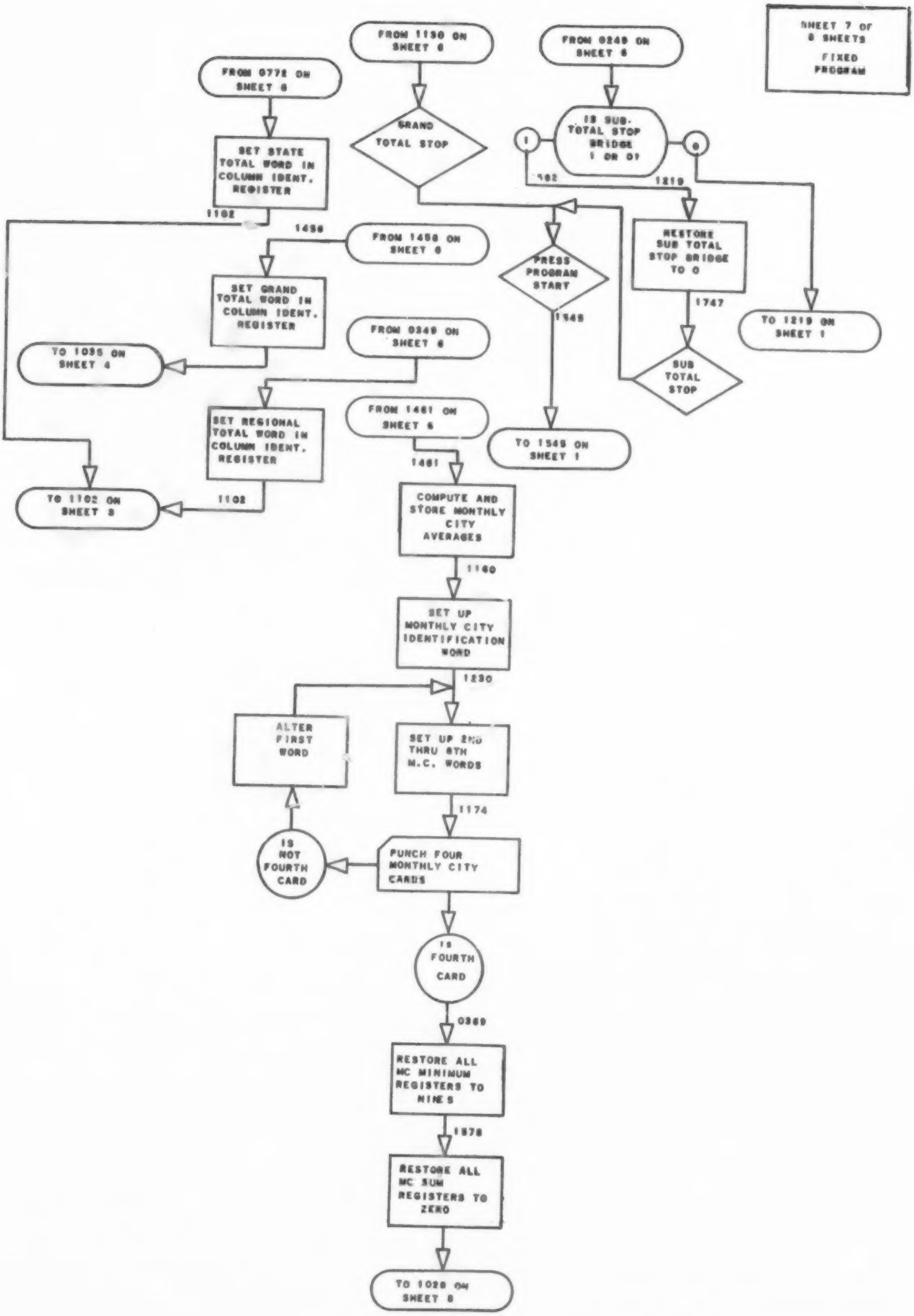

FROM 1050 ON SHEET 1
SHEET 2 OF 8 SHEETS
FIXED PROGRAM
1567
PRESS PROGRAM START
IS YEAR SAME AS IN LOC.-TIME WORD?
N
Y
0748
STORE PAST YEAR IN PAST YEAR REGISTER
1117
1998
YEAR SEQUENCE STOP
0847
N
IS CARD IN YEAR SEQUENCE?
Y
1029
SET ANNUAL SITE SITE TOTAL, BRIDGE TO 0
FROM 1101 ON SHEET 1
ADD ONE YEAR TO BOTH LOC.-TIME WORD AND YEAR INDEX
N
IS CARD SAME AS LOC.-TIME WORD?
Y
1101
1227
1982
1127
IS YEAR PLUS ONE EQUAL TO 10?
1139
Y
N
STORE YEAR ZERO AS YEAR INDEX
1173
STORE AS NEW YEAR INDEX
1050
N
ARE THERE DIGITS IN THE ANNUAL SITE COUNT REGISTER?
Y
Y
IS MONTH ZERO?
N
1567
0279
0045
1982
MONTH SEQUENCE STOP
0046
N
IS CARD IN MONTH SEQUENCE?
Y
1135
IMPOSSIBLE MONTH STOP
1547
Y
IS MONTH HIGHER THAN TWELVE?
N
1110
1110
SET INITIALIZATION BRIDGE TO 1
ADD ONE MONTH TO BOTH LOC.-TIME WORD AND MONTH INDEX
1795
1211
N
IS CARD SAME AS LOC.-TIME WORD?
Y
1101
TO 1795 ON SHEET 3
TO 1567 ON SHEET 1
TO 1101 ON SHEET 3


FROM 1795 ON SHEET 2
1795
SET ANNUAL SITE WORD IN COLUMN IDENTIFICATION REGISTER
1558
ADD ONE INTO ANNUAL SITE REG. AND SET PUNCH BY PASS BRIDGE TO 0
0561
ADD ANNUAL SITE COUNT TO PROPER ANNUAL CITY COUNT REG.
1792
ADD ANNUAL SITE SUM TO PROPER ANNUAL CITY SUM REGISTER
0783
STORE GREATER OF ANNUAL SITE MAXIMUM & REG. IN PROPER ANN. CITY MAX. REG.
0182
STORE LESSER OF ANN. SITE MIN. AND REG. IN PROPER ANNUAL CITY MIN. REG.
FROM 1102 ON SHEETS 6, 7, & 8
1102
ADD COUNT TO NEXT HIGHER CATEGORY COUNT TOTAL REGISTER
1292
ADD SUM TO NEXT HIGHER CATEGORY SUM REGISTER
1793
HAS SUM REGISTER OVERFLOWED?
Y
N
1647
1661
SUM OVERFLOW STOP
TO 1492 ON SHEET 4
1492
PRESS PROGRAM START
FROM 1101 ON SHEET 2
ADD ONE TO ANNUAL SITE COUNT REGISTER
1190
ADD DATA TO ANNUAL SITE SUM REGISTER
1091
STORE GREATER OF DATA OR REGISTER IN ANNUAL SITE MAXIMUM REG.
1067
STORE LESSER OF DATA OR REGISTER IN ANNUAL SITE MINIMUM REG.
1548
ADD ONE TO PROPER FREQ. DIST. TABLE INTERVALS FOR ALL PROPER TABLES
ADD DATA TO PROPER MONTHLY CITY SUM REG.
1169
ADD ONE TO PROPER MONTHLY CITY COUNT REG.
1655
STORE GREATER OF DATA OR REGISTER IN PROPER MONTHLY CITY MAXIMUM REGISTER
1867
STORE LESSER OF DATA OR REGISTER IN PROPER MONTHLY CITY MINIMUM REGISTER
1574
STORE CARD LOC.-TIME IDENTIFICATION
TO 1567 ON SHEET 1
FROM 1095 ON SHEET 4
FROM 1244 ON SHEET 1
SHEET 3 OF 8 SHEETS
FIXED PROGRAM
RESET INITIAL YEAR REGISTER TO ZEROS
1798
SET ANNUAL SITE - SITE TOTAL BRIDGE TO 1
1098
IS CARD A GRAND TOTAL CARD?
Y
N
0872
0158
SET BOTH GRAND TOTAL BRIDGES TO 1
IS CARD A SUB-TOTAL CARD?
Y
N
0179
SET SUB-TOTAL BRIDGE TO 1
1100
1100
IS CARD FOR A NEW SITE IN SAME CITY?
Y
N
0480
0478
SET SITE TOTAL CITY TOTAL BRIDGE TO 0
IS CARD FOR NEW CITY?
Y
N
1095
1095
0178
STORE YEAR INDEX
SET SITE TOTAL CITY TOTAL BRIDGE TO 1
1996
0172
ARE THERE DIGITS IN THE ANNUAL SITE COUNT REG.?
Y
N
TO 1472 ON SHEET 6
1095
0172
SET CITY TOTAL-STATE TOTAL BRIDGE TO 0
SET CITY NUMBER IN LOC.-TIME WORD
0771
0262
IS CARD FOR NEW STATE?
N
Y
TO 0986 ON SHEET 4


SHEET 4 OF 8 SHEETS
FIXED PROGRAM
FROM 1492 ON SHEET 3
1492
STORE GREATER IN NEXT HIGHER CATEGORY MAXIMUM REGISTER
0992
STORE LESSER IN NEXT HIGHER CATEGORY MINIMUM REGISTER
FROM 0695 ON SHEET 6
0695
IS PUNCH, BY-PASS BRIDGE ONE OR ZERO
0
1
1347
FROM 1035 ON SHEET 7
1035
0
IS ANNUAL CITY PUNCH BY PASS BRIDGE ONE OR ZERO?
1
0046
RESTORE ANNUAL CITY YEAR IDENTIFICATION REGISTER
1098
1098
RESTORE PUNCH BY PASS BRIDGE TO 0
0346
IS COLUMN IDENTIFICATION FOR STATE TOTAL?
Y
N
0746
1552
RESTORE STATE TOTAL YEAR IDENTIFICATION REGISTERS
1552
TO 1552 ON SHEET 5
COMPUTE AVERAGE AND STORE IN PROPER REGISTER
1202
COMPUTE AND STORE CUMULATIVE FREQUENCY DISTRIBUTION.
1040
COMPUTE AND STORE 10% THRU 90% DECILES
1368
STORE TENS DIGIT OF YEAR
0082
FROM 0966 ON SHEET 3
SET CITY TOTAL-STATE TOTAL BRIDGE TO 1
0099
IS CARD FOR NEW REGION?
N
Y
0459
0876
SET STATE NUMBER IN LOC.-TIME WORD
SET STATE TOTAL-REGIONAL TOTAL BRIDGE TO 1
0878
0750
SET STATE TOTAL-REGIONAL TOTAL BRIDGE TO 0
SET REGION NUMBER IN LOC.-TIME WORD
1095
1095
TO 1095 ON SHEET 3
IS OUTPUT FOR ANNUAL SITE?
1057
N
Y
1058
TO 1969 ON SHEET 5
IS OUTPUT FOR SITE TOTAL?
N
Y
1969
SET UP SITE TOTAL IDENT. WORD
TO 1960 ON SHEET 5
IS YEAR INITIAL OR SUBSEQUENT?
I
S
1032
STORE INITIAL ANNUAL SITE YEAR
FROM 1481 ON SHEET 5
1481
STORE TERMINAL ANNUAL SITE YEAR
TO 0649 ON SHEET 5
TO 1063 ON SHEET 5

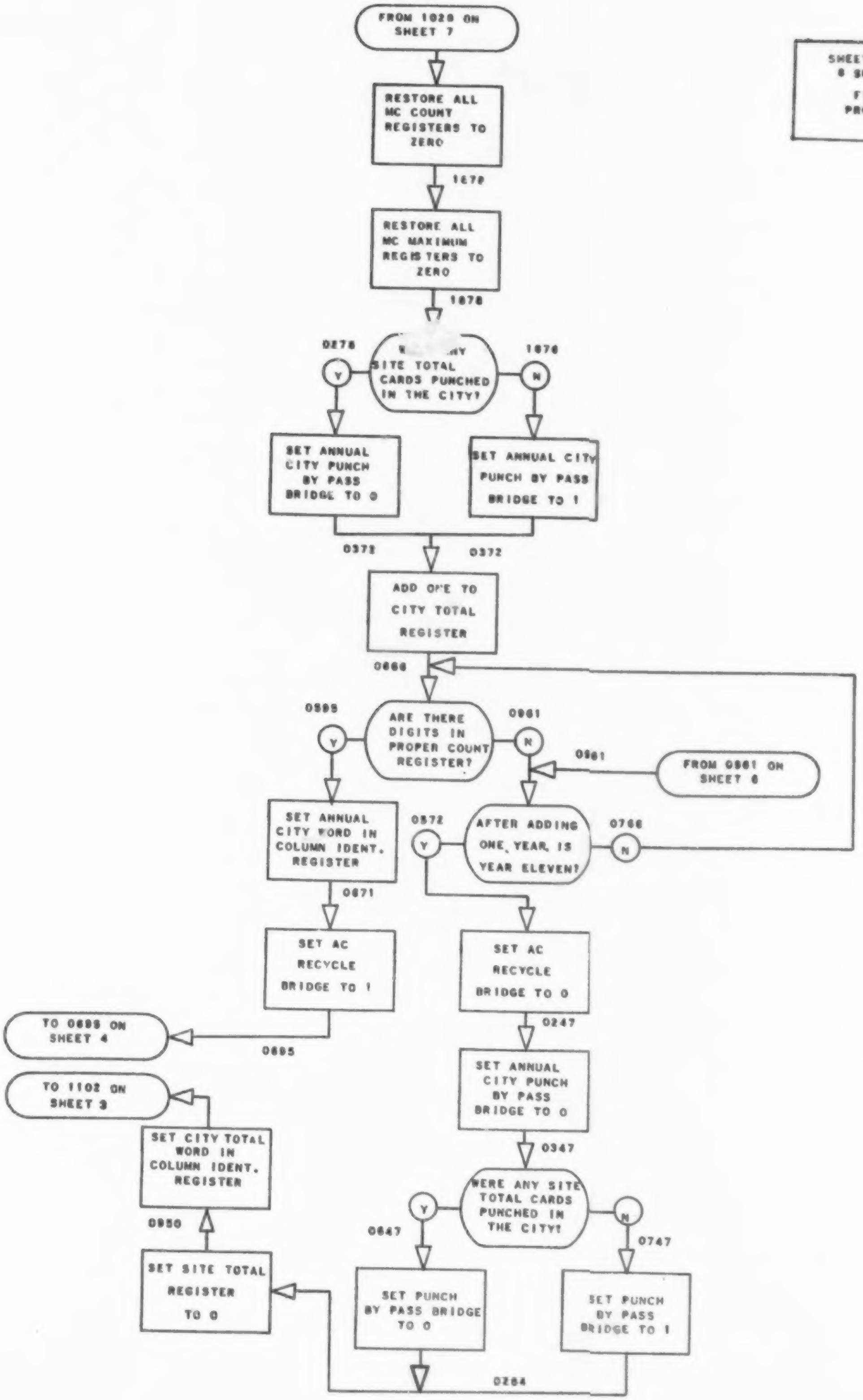

FROM 1980 ON SHEET 4
FROM 1988 ON SHEET 4
1988
IS OUTPUT FOR ANNUAL CITY?
N
Y
1974
SET UP ANNUAL CITY IDENT. WORD
1980
1975
IS OUTPUT FOR CITY TOTAL?
N
Y
1993
SET UP CITY TOTAL IDENT. WORD
0548
RESTORE CITY TOTAL YEAR REGISTERS
1980
1992
IS OUTPUT FOR STATE TOTAL
N
Y
1987
1074
IS OUTPUT FOR REGIONAL TOTAL?
N
Y
0396
SET UP REGIONAL TOTAL IDENT. WORD
0849
RESTORE REGIONAL TOTAL YEAR REGISTERS
1980
0980
SET UP GRAND TOTAL IDENT. WORD
1649
RESTORE GRAND TOTAL YEAR REGISTERS
1980
SET UP STATE TOTAL IDENT. WORD
1047
RESTORE STATE TOTAL YEAR REGISTERS
1980
1980
FROM 1065 ON SHEET 4
1065
STORE INITIAL ANNUAL CITY YEAR
0774
STORE INITIAL STATE TOTAL YEAR
0274
STORE INITIAL REGIONAL TOTAL YEAR
0674
STORE INITIAL GRAND TOTAL YEAR
1579
STORE INITIAL ANNUAL SITE IDENT. WORD PARTS
1461
TO 1461 ON SHEET 4
FROM 0649 ON SHEET 4
0649
STORE TERMINAL ANNUAL CITY YEAR
1584
STORE TERMINAL STATE TOTAL YEAR
0064
STORE TERMINAL REGIONAL TOTAL YEAR
0884
STORE TERMINAL GRAND TOTAL YEAR
1043
SET UP ANNUAL SITE IDENT. WORD
1980
REPLACE DUPLICATE TERMINAL YEAR WITH 00
0745
SET UP 2ND THRU 8TH OUTPUT CARD WORDS
1287
PUNCH OUTPUT CARD
1552
1552
FROM 1552 ON SHEET 4
RESET FREQ. DIST. MAX. & COUNT TO 0
1396
RESET MINIMUM TO NINES
1472
TO 1472 ON SHEET 6
SHEET 5 OF 6 SHEETS
FIXED PROGRAM


SHEET 6 OF 8 SHEETS
FIXED PROGRAM
FROM 1472 ON SHEETS 3 & 5
1472
IS AS-ST BRIDGE 1 OR 0?
1
0
1694
0194
RESTORE AS-ST BRIDGE TO 0
0680
ARE THERE DIGITS IN ST COUNT REGISTER?
1779
Y
N
0862
0
IS AC RE-CYCLE BRIDGE 1 OR 0?
0861
1
TO 0861 ON SHEET 8
0075
IS ST-CT BRIDGE 1 OR 0?
0076
1
0
0076
RESTORE ST-CT BRIDGE TO 0
0474
WERE ANY ANNUAL CARDS PUNCHED IN THE SITE
Y
N
0472
0471
SET PUNCH BY PASS BRIDGE TO 0
SET PUCNCH BY PASS BRIDGE TO 1
0364
IS CT-TS BRIDGE 1 OR 0?
0094
0093
1461
ARE THERE DIGITS IN CT COUNT REGISTER?
Y
N
TO 1461 ON SHEET 7
RESTORE CT-TS BRIDGE TO 0
0244
SET ANNUAL SITE REGISTER TO ZERO
0365
0382
ARE THERE DIGITS IN TS COUNT REGISTER?
Y
N
0094
SET SITE TOTAL WORD IN COLUMN IDENT. REGISTER
0456
0256
IS TS-RT BRIDGE 1 OR 0?
0257
ADD ONE INTO SITE TOTAL REGISTER
RESTORE TS-RT BRIDGE TO 0
0257
IS RT-GT BRIDGE 1 OR 0?
TO 1102 ON SHEET 3
0382
0444
0071
0349
ARE THERE DIGITS IN RT COUNT REGISTER?
Y
N
RESTORE RT-GT BRIDGE TO 0
0876
WERE ANY CITY TOTAL CARDS PUNCHED IN THE STATE?
0376
Y
N
TO 1498 ON SHEET 7
0897
SET PUNCH BY PASS BRIDGE TO 0
SET PUNCH BY PASS BRIDGE TO 1
RESTORE GT STOP BRIDGE TO 0
0545
IS GT STOP BRIDGE 1 OR 0?
0184
0184
SET CITY TOTAL REGISTER TO ZERO
TO 0772 ON SHEET 7
TO 0349 ON SHEET 7
TO 1130 ON SHEET 7
TO 0249 ON SHEET 7


SHEET 7 OF 8 SHEETS
FIXED PROGRAM
FROM 0772 ON SHEET 6
FROM 1130 ON SHEET 6
FROM 0249 ON SHEET 6
GRAND TOTAL STOP
IS SUB-TOTAL STOP BRIDGE 1 OR 0?
1
0
1502
1219
SET STATE TOTAL WORD IN COLUMN IDENT. REGISTER
1102
1456
FROM 1456 ON SHEET 6
PRESS PROGRAM START
RESTORE SUB TOTAL STOP BRIDGE TO 0
1747
1548
TO 1219 ON SHEET 1
SET GRAND TOTAL WORD IN COLUMN IDENT. REGISTER
FROM 0349 ON SHEET 6
TO 1035 ON SHEET 4
SUB TOTAL STOP
SET REGIONAL TOTAL WORD IN COLUMN IDENT. REGISTER
FROM 1461 ON SHEET 6
TO 1548 ON SHEET 1
1461
TO 1102 ON SHEET 3
1102
COMPUTE AND STORE MONTHLY CITY AVERAGES
1160
SET UP MONTHLY CITY IDENTIFICATION WORD
1230
ALTER FIRST WORD
SET UP 2ND THRU 8TH M.C. WORDS
1174
IS NOT FOURTH CARD
PUNCH FOUR MONTHLY CITY CARDS
IS FOURTH CARD
0369
RESTORE ALL MC MINIMUM REGISTERS TO NINES
1578
RESTORE ALL MC SUM REGISTERS TO ZERO
TO 1028 ON SHEET 8

SHEET 8 OF
8 SHEETS

FIXED
PROGRAM


FROM 1028 ON SHEET 7
RESTORE ALL MC COUNT REGISTERS TO ZERO
1678
RESTORE ALL MC MAXIMUM REGISTERS TO ZERO
1878
0278
[illegible] ANY SITE TOTAL CARDS PUNCHED IN THE CITY?
1876
Y
N
SET ANNUAL CITY PUNCH BY PASS BRIDGE TO 0
SET ANNUAL CITY PUNCH BY PASS BRIDGE TO 1
0372
0372
ADD ONE TO CITY TOTAL REGISTER
0666
0595
ARE THERE DIGITS IN PROPER COUNT REGISTER?
0961
Y
N
0961
FROM 0961 ON SHEET 6
SET ANNUAL CITY WORD IN COLUMN IDENT. REGISTER
0572
AFTER ADDING ONE, YEAR, IS YEAR ELEVEN?
0766
Y
N
0671
SET AC RECYCLE BRIDGE TO 1
SET AC RECYCLE BRIDGE TO 0
TO 0695 ON SHEET 4
0695
0247
SET ANNUAL CITY PUNCH BY PASS BRIDGE TO 0
TO 1102 ON SHEET 3
0347
SET CITY TOTAL WORD IN COLUMN IDENT. REGISTER
WERE ANY SITE TOTAL CARDS PUNCHED IN THE CITY?
Y
N
0950
0647
0747
SET SITE TOTAL REGISTER TO 0
SET PUNCH BY PASS BRIDGE TO 0
SET PUNCH BY PASS BRIDGE TO 1
0284

NASN FIXED PROGRAM **PAGE 1 of 15 PAGES**

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1545	70	0096	0046	From 1545 Page 11
0046	65	1127	0644	
0644	20	1215	0744	
0744	21	1114	0844	
0844	65	0051	0557	
0557	35	0007	0672	
0672	11	8002	0579	
0579	10	1842	0594	
0594	30	0003	0158	
0158	20	1100	0098	
0098	60	005*	1116	Mandatory Card
1116	60	0051	0574	
0574	15	1108	0982	
0982	35	0007	0348	
0348	11	8002	1670	
1670	46	0145	0073	
0145	65	0052	0245	
0245	35	0001	1450	
1450	44	0345	0073	
0345	11	0165	0445	
0445	44	0047	0073	
0047	01	1991	1567	
1567	70	0096	0074	From 1567 Pages 2, 3 and 4
0074	60	0051	0069	
0069	11	1108	0448	
0448	35	0007	1662	
1662	44	1244	1148	To 1244 Page 4
1148	67	0052	1572	From 1148 Page 2
1572	35	0001	0698	
0698	11	0374	1044	
0374	00	0000	000*	Mandatory Card
1044	44	1567	0749	
1044	44	1567	1744	Laboratory Discrimination Card
1744	67	0053	1844	
1844	35	0006	1644	
1644	11	8003	1544	
1544	16	1645	1444	
1645	**	0000	0000	Optional Card
1444	45	1567	0749	
0749	65	1454	1659	
1454	**	***0	0000	Mandatory Card
1659	35	0001	1565	
1565	21	1570	1573	
1573	11	8003	1031	
1031	35	0001	0295	
0295	21	0550	1856	
1856	11	8003	1665	
1665	35	0001	0173	
0173	21	0079	1782	
1782	67	0052	0857	
0857	35	0001	1663	
1663	11	8003	1874	
1874	35	0001	0182	
0182	21	1796	0599	
0599	11	8003	0757	
0757	35	0001	1763	
1763	21	1568	1674	
1674	60	1570	1575	
1575	44	0383	1884	
0383	11	1144	0949	
0949	44	1657	1658	
1657	65	0052	1757	
1757	46	1884	1765	
1765	20	1563	1567	
1658	65	0052	1758	
1758	46	1236	1557	
1236	67	0052	1765	
1884	67	0052	1557	
1557	20	1563	1866	
1866	60	0550	1856	

NASN FIXED PROGRAM

PAGE 2 of 15 PAGES

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1658	44	0958	1559	
0958	11	1796	1559	
1559	44	1567	1459	To 1567 Page 1
1459	60	0079	1584	
1584	44	1041	1042	
1041	11	1143	1049	
1049	44	1759	1560	
1759	10	8001	1668	
1668	11	1566	0049	
1560	60	1796	0049	
1042	60	1568	0049	
0049	44	1567	1564	To 1567 Page 1
1564	60	1563	1348	
1348	15	0051	1774	
1774	35	0001	0482	
0482	16	8002	0598	
0598	30	0002	1189	
1189	20	1000	1797	
1797	60	0050	0956	
0050	**	0000	0000	Mandatory Card
0956	11	1000	1748	
1748	46	1567	1848	
1848	60	8001	1948	
1948	11	0863	1850	
0863	**	0000	0000	Mandatory Card
1850	46	1567	~~0398~~ 1595	
~~0399~~ 1593	67	005*	1997	Operation cards
~~0398~~ 1595	65	0053	0043	
0043	46	1567	1997	
0043	46	0143	1567	
0143	67	0053	1997	
1997	35	000*	1550	
1997	35	000*	0944	
0944	11	8003	1344	
1344	35	000*	1550	
1550	21	1022	1206	
1206	60	1003	0266	
0266	11	1876	1584	
1584	44	0149	1567	To 1567 Page 1
0149	60	0051	1105	
1105	11	1108	1113	
1113	44	1050	1101	To 1101 Page 3
1219	69	1122	1225	From 1219 Page 11
1225	24	1213	1266	
1266	65	1108	1463	
1463	35	0001	1120	
1120	21	1124	1181	
1181	11	8001	~~1598~~ 0393	
~~1598~~ 0393	35	0002	0699	
0699	11	8003	1107	
1107	10	0665	1171	
1171	30	0002	1034	
1034	10	1124	1261	
1261	30	0001	0275	
0275	20	1108	1218	
1218	60	1366	1221	
1221	44	1125	1195	
1125	20	1366	1148	To 1148 Page 1
1195	21	1114	1275	
1275	60	1108	0556	
0556	36	0001	1473	
1473	30	0001	1952	
1952	21	1108	1148	To 1148 Page 1
1050	65	1108	0280	From 1050 Page 3
0280	35	0001	1696	
1696	21	0150	0648	
0648	65	0051	1163	
1163	35	0001	1282	
1282	16	8002	1345	
1345	11	0150	1169	

NASN FIXED PROGRAM

PAGE 3 of 15 PAGES

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1169	44	1117	0748	
1117	60	1000	1022	
1022	11	0048	1555	
1555	46	0947	1029	
0947	01	1992	1567	To 1567 Page 1
1029	65	1108	1123	
1123	15	1126	1231	
1231	20	1108	1111	
1111	10	1114	0957	
0957	21	1950	1119	
1119	10	1122	1227	
1227	11	1216	1185	
1185	44	1139	1127	
1139	10	8001	1127	
1127	21	1114	1173	
1173	60	1887	1141	
1141	44	0279	1050	To 1050 Page 2
0279	24	1366	1795	To 1795 Page 5
0748	69	1000	0898	
0898	24	0048	1998	
1998	21	1026	0879	
0879	60	0051	1133	
1133	11	1108	0874	
0874	44	1982	1101	
1982	46	0045	1135	
0045	01	1993	1567	To 1567 Page 1
1135	65	0051	1005	
1005	35	0001	1161	
1161	11	8003	1069	
1069	35	0002	1129	
1129	16	8002	1137	
1137	1[illegible]	1650	1145	
1145	1[illegible]	8003	1672	
1672	16	8001	1103	
1103	46	1547	1110	
1547	01	1994	1567	To 1567 Page 1
1110	65	1213	1167	
1167	15	1122	1177	
1177	20	1213	1166	
1166	60	1108	1263	
1263	10	1216	1121	
1121	21	1108	1211	
1211	15	0051	1355	
1355	11	8003	0565	
0565	16	8001	1363	
1363	45	1110	1101	
1101	60	1887	1191	From 1101 Page 2
1191	10	1144	1149	
1149	21	1887	1190	
1190	60	1888	1143	
1143	10	1009	1063	
1063	21	1888	1091	
1091	60	1889	1203	
1203	11	1009	1013	
1013	46	1066	1067	
1066	24	1889	1067	
1067	60	1886	1193	
1193	11	1009	1863	
1863	46	1548	1217	
1217	24	1886	1548	
1548	65	1009	0350	
0350	35	0005	0798	
0798	20	1448	1466	
1466	65	1168	1073	From 1466 Page 4
1073	69	1448	1162	
1162	84	1300	1025	
1025	69	1128	1131	
1131	22	1128	8002	
1036	15	1144	1128	
1150	60	1162	1267	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1267	11	1170	1075	
1075	44	1179	1180	
1179	10	0081	1186	
1186	21	1162	1466	To 1466 Page 3
1180	69	1183	1187	
1187	24	1162	1165	
1165	65	1114	1019	
1019	69	1087	1184	
1184	22	1087	1090	
1090	65	1093	1198	
1198	69	1448	1087	
1226	69	1229	1132	
1132	22	1229	8002	
1240	15	1144	1229	
~~1199~~ 1799	65	1213	1017	
1017	15	1220	8002	
1455	10	1009	0963	
0963	15	1016	1021	
1021	15	1213	8002	
1109	65	1213	1467	
1467	15	1270	8002	
1007	10	1882	1465	
1465	15	1468	1021	
1655	65	1213	1767	
1767	15	1020	8002	
1457	11	1009	0763	
0763	46	1666	1867	
1666	60	8001	1223	
1223	15	1076	1021	
1867	65	1213	0767	
0767	15	1770	8002	
1209	11	1009	0563	
0563	46	1574	0667	
0667	60	8001	1375	
1375	15	1178	1021	
1574	69	.0051	0157	
0157	24	1158	1567	To 1567 Page 1
1244	20	0048	1798	From 1244 Page 1
1798	69	1882	1879	
1879	24	1026	1098	
1098	67	0052	1094	
1094	35	0001	1494	
1494	44	0156	0972	
0156	11	0165	0073	
0073	44	1100	0179	
0179	24	1852	1100	
0972	69	1882	1445	
1445	24	0783	0794	
0794	24	0361	1100	
1100	65	1108	0461	From 1100 Page 5
0461	15	0665	1648	
1648	20	1108	0070	
0070	16	0051	0456	
0456	35	0003	0465	
0465	11	8003	0473	
0473	45	0478	0480	
0480	21	0765	1095	
1095	69	1114	1872	From 1095 Pages 5, 8
1872	24	1950	1996	
1996	60	1887	0176	To 1795 Page 5
0176	44	1795	1472	To 1472 Page 11
0478	60	1108	0066	
0066	30	0001	0273	
0273	16	8002	0381	
0381	35	0007	0296	
0296	21	0356	0161	
0161	60	0051	0357	
0357	30	0001	1766	
1766	16	8002	1776	
1776	35	0007	1883	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1883	11	0356	0662	
0662	44	0178	1100	To 1100 Page 4
0178	65	1882	1146	
1146	20	0765	0172	
0172	60	0051	0457	
0457	30	0004	0283	
0283	20	0394	0297	
0297	60	1108	0366	
0366	30	0004	0373	
0373	16	8002	0294	
0294	15	0394	0199	
0199	35	0004	0258	
0258	21	1108	0262	
0262	60	0051	0656	
0656	11	1108	0866	
0866	30	0004	0174	
0174	16	8002	0195	
0195	35	0007	0162	
0162	44	0966	0771	To 0966 Page 8
0771	20	0679	1095	To 1095 Page 4
1795	69	0998	1651	From 1795 Page 3 and 4
1651	24	1755	1558	
1558	65	0962	0568	
0568	15	1882	0978	
0978	21	0481	0484	
0484	20	0962	0561	
0561	65	1950	0159	
0159	10	8002	0668	
0668	15	1372	0477	
0477	10	1780	0285	
0285	21	1692	8002	
1592	10	1887	1692	
1792	65	1950	0661	
0651	10	8002	0370	
0370	15	0773	0377	
0377	10	1880	0185	
0185	21	0492	8002	
0893	10	1888	0492	
0793	65	1950	0761	
0761	10	8002	0270	
0270	15	0673	0277	
0277	10	0880	0085	
0085	21	0392	8002	
0693	11	1889	0593	
0593	46	0392	0192	
0192	65	1950	0861	
0861	10	8002	0170	
0170	15	0573	0177	
0177	10	0780	0092	
0092	21	1246	8002	
0292	11	1886	0493	
0493	46	1102	1246	
1102	60	1755	0860	From 1102 Pages 11, 13
0860	11	0864	0269	
0269	15	8003	0777	
0777	10	1580	0585	
0585	15	1238	1693	
1693	21	1496	1351	
1351	20	1192	1247	
1247	60	1755	0760	
0760	10	0764	8003	
1292	60	1755	0660	
0660	11	0864	0169	
0169	15	8003	0677	
0677	10	1680	0485	
0485	15	1392	1597	
1597	21	1652	1556	
1556	20	1661	0664	
0664	60	1755	0560	
0560	10	0564	8003	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1793	44	1647	1661	From 0677 Page 5 (Constant 1680)
1647	01	1995	1661	To 1556 Page 5
1492	60	1755	0460	From 0485 Page 5 (Constant 1392)
0460	11	0864	0570	
0570	15	8003	1778	
1778	10	0681	0992	
0992	15	0795	0799	
0799	21	1754	1257	
1257	20	1761	0464	
0464	65	1.755	0360	
0360	15	0364	1754	
0993	46	1761	0892	
0892	60	1755	0260	
0260	11	0864	0470	
0470	15	8003	0577	
0577	10	0980	0385	
0385	15	0792	0997	
0997	21	1752	1656	
1656	20	1861	0264	
0264	65	1755	0160	
0160	15	0164	1752	
0592	46	0695	1861	
0695	60	0481	0293	From 0695 Page 13
0293	44	1698	1347	
1347	60	0147	1447	
1447	44	0046	1035	
1698	20	0481	0346	
0346	60	1755	0446	
0446	11	0576	0646	
0646	44	1552	0746	To 1552 Page 10
0046	60	17.49	0146	
0146	21	0969	0246	
0246	20	1208	1698	
0746	60	1749	0846	
0846	21	1027	0946	
0946	20	0476	1552	To 1552 Page 10
1035	65	1755	1061	From 1035 Page 11
1061	10	8002	1669	
1669	10	1172	1377	
1377	21	1182	1485	
1485	15	1088	1293	
1293	69	1096	1249	
1249	22	1002	1006	
1006	15	1011	8002	
1202	65	1755	1210	
1210	10	8001	1367	
1367	15	1370	1475	
1370	00	00 **	0000	Mandatory Card
1475	15	1228	1233	
1233	10	8001	1291	
1291	20	1295	1298	
1298	21	1352	8003	
1262	35	0005	1269	
1269	15	1675	1280	
1280	20	1675	1278	
1278	15	8003	1285	
1285	20	1900	1003	
1003	60	1352	1357	
1357	10	1194	1365	
1365	11	1295	1350	
1350	44	1353	1354	
1353	10	8001	1460	
1460	15	1285	1290	
1290	15	1194	0068	
0068	20	1285	1298	
1354	69	0091	1775	
1775	24	1285	1750	
1750	21	1675	1040	
1040	65	1755	1010	
1010	15	1088	1068	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1068	15	1071	8002	
1070	20	1859	1164	
1164	65	1859	0567	
0567	15	1212	1877	
1877	20	1212	1391	
1391	31	0001	1196	
1196	35	0005	1453	
1453	20	1115	1118	
1118	65	1271	1875	
1875	69	1115	1268	
1268	84	1900	1248	
1248	20	1553	1360	
1360	16	1271	1777	
1777	45	1281	0682	
0682	69	0762	1569	
1569	24	1072	1553	
1099	20	1104	1072	
1349	35	0005	0479	
0479	44	1855	0558	
0558	16	8002	1452	
1452	20	1891	1399	
1399	60	1452	1860	
1860	10	1194	1264	
1264	21	1452	1106	
1106	11	0065	1265	
1265	44	1164	1470	
1470	10	8001	1277	
1277	11	0080	1385	
1385	21	1452	1358	
1358	20	1212	1368	
1281	15	8001	1356	
1356	16	1194	0663	
0663	69	1566	1369	
1369	22	1072	1553	
1855	20	1660	0463	
0463	21	1018	1371	
1371	65	1104	1760	
1760	16	1115	1469	
1469	35	0005	0975	
0975	20	1381	1134	
1134	16	8002	0148	
0148	19	1660	1215	
1215	54	1018	0078	
0078	10	1381	1085	
1085	11	8002	1697	
1697	65	8003	1393	
1393	31	0005	1452	
1368	60	1563	1667	
1667	30	0001	0974	
0974	20	1279	0082	
0082	60	1755	1059	
1059	11	0998	1653	
1653	44	1057	1058	
1057	10	1561	1965	
1965	44	1968	1969	**To 1968 Page 8**
1969	65	0580	1985	
1985	15	1596	0450	
0450	20	1077	1980	**To 1980 Page 9**
1058	60	0962	1769	
1769	11	1882	1477	
1477	44	1481	1032	
1032	65	1158	1062	
1062	30	0001	1869	
1869	15	1279	1283	
1283	35	0002	1089	
1089	16	8002	0697	
0697	35	0002	0848	
0848	21	1112	1065	**To 1065 Page. 8**
1481	65	1158	0263	**From 1481 Page 8**
0263	30	0001	1274	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1274	15	1279	0483	
0483	35	0002	1491	
1491	21	1596	0649	To 0649 Page 9
0966	21	0679	0099	From 0966 Page 5
0099	60	1108	0466	
0466	10	1194	0499	
0499	21	1108	0871	
0871	11	0051	0756	
0756	35	0003	0971	
0971	44	1175	0878	
0878	21	0197	1095	To 1095 Page 4
1175	35	0001	1999	
1999	44	0099	0876	
0876	69	1882	0994	
0994	24	0197	0750	
0750	60	1108	0562	
0562	10	1122	0778	
0778	21	1108	0261	
0261	11	0051	0358	
0358	35	0003	0072	
0072	44	0750	1095	To 1095 Page 4
1065	65	0969	1224	From 1065 Page 7
1224	16	1112	0869	
0869	46	0774	0775	
0775	24	0969	0774	
0774	65	1027	0261	
0281	16	1112	0769	
0769	46	0274	0875	
0875	24	1027	0274	
0274	65	0979	1383	
1383	16	1112	0970	
0970	46	0674	0976	
0976	24	0979	0674	
0674	65	1679	1483	
1483	16	1112	1870	
1870	46	1579	1380	
1380	24	1679	1579	
1579	60	1158	0363	
0363	30	0001	1471	
1471	20	0180	0583	
0583	16	8002	1395	
1395	35	0007	1008	
1008	30	0003	1571	
1571	21	0380	0863	
0883	10	0180	1136	
1136	10	1112	1671	
1671	21	0580	1481	To 1481 Page 7
1968	60	1755	1959	From 1968 Page 7
1959	11	1216	1971	
1971	46	1974	1975	To 1975 Page 9
1974	65	1158	1963	
1963	30	0001	1970	
1970	35	0004	0984	
0984	20	0095	0298	
0298	60	1755	1960	
1960	30	0004	1972	
1972	21	1976	0584	
0584	65	0969	1973	
1973	30	0003	0784	
0784	20	0491	0498	
0498	60	1208	1953	
1953	30	0001	1961	
1961	21	1966	1176	
1176	11	8003	1983	
1983	35	0003	1045	
1045	21	0250	1954	
1954	65	1966	1977	
1977	16	0495	0299	
0299	45	1955	1956	To 1955 Page 9
1956	65	8001	1978	To 1978 Page 9

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1955	60	0250	1957	From 1955 Page 8
1957	11	1976	1981	
1981	46	1984	1986	
1986	65	1966	1978	
1984	65	0495	1978	
1978	35	0003	1987	From 1978 Page 8
1987	15	0095	0850	
0850	15	1976	0450	
0450	20	1077	1980	
1975	11	1979	1988	From 1975 Page 8
1988	44	1992	1993	
1993	65	1158	1964	
1964	30	0001	1990	
1990	35	0004	1046	
1046	15	0969	1989	
1989	15	1208	1958	
1958	20	1077	0548	
0548	65	1749	1012	
1012	20	0969	0948	
0948	21	1208	1980	
1992	10	1561	1962	
1962	44	1967	1074	
1074	65	1158	0497	
0497	30	0004	0597	
0597	35	0007	0797	
0797	15	1027	1097	
1097	15	0476	0449	
0449	20	1077	1047	
1047	65	1749	1024	
1024	20	1027	0198	
0198	21	0476	1960	
1967	10	8001	0097	
0097	44	0996	0396	
0396	65	1158	0496	
0496	30	0006	0596	
0596	35	0009	0696	
0696	15	0979	0796	
0796	15	0077	0896	
0896	20	1077	0849	
0849	65	1749	0549	
0549	20	0979	1048	
1048	21	0077	1980	
0996	65	1679	0196	
0196	15	1591	1296	
1296	20	1077	1649	
1649	69	1749	1849	
1849	24	1679	1949	
1949	21	1591	1980	
0649	65	1208	0063	From 0849 Page 8
0063	16	1596	0658	
0658	46	0163	1064	
0163	24	1208	1064	
1064	65	0476	1284	
1284	16	1596	0758	
0758	46	1014	0064	
1014	24	0476	0064	
0064	65	0077	0684	
0684	16	1596	0959	
0959	46	0882	0884	
0882	24	0077	0884	
0884	65	1591	0395	
0395	16	1596	1359	
1359	46	1784	1043	
1784	24	1591	1043	
1043	65	1596	0546	
0546	35	0002	1951	
1951	15	0380	0650	
0650	15	0180	0450	
0450	20	1077	1980	
1980	60	1077	0183	From 1980 Page 7

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
0183	30	0004	0894	
0894	21	0166	0276	
0276	11	8003	0983	
0983	35	0002	1394	
1394	16	8002	1576	
1576	30	0002	0645	
0645	16	8001	0578	
0578	45	0745	0379	
0379	15	8001	0845	
0845	10	0166	0945	
0945	35	0004	1995	
1995	21	1077	0745	
0745	65	1755	1991	
1991	15	1994	8002	
1241	15	1454	1159	
1159	20	1078	1581	
1581	65	1755	1259	
1259	15	1362	8002	
1691	35	0005	1197	
1197	10	1891	1495	
1495	21	1079	1382	
1382	60	1892	1297	
1297	35	0005	1374	
1374	10	1893	1397	
1397	21	1080	1239	
1239	60	1894	1499	
1499	35	0005	1474	
1474	10	1895	1449	
1449	21	1081	0083	
0083	60	1896	1201	
1201	35	0005	1272	
1272	10	1897	1001	
1001	21	1082	1235	
1235	60	1898	1853	
1853	35	0005	1276	
1276	10	1899	1753	
1753	21	1083	1286	
1286	65	1755	0859	
0859	15	1562	8002	
1493	35	0005	1599	
1599	15	1755	0759	
0759	15	1462	8002	
1245	21	1084	1287	
1287	71	1077	1552	
1552	65	1755	0659	From 1552 Page 6
0659	10	8002	0967	
0967	10	0870	0675	
0675	21	1480	1033	
1033	11	8003	1791	
1791	10	8002	1379	
1379	10	1482	1237	
1237	21	1142	1595	
1595	15	1398	1004	
1004	20	0559	1142	
1289	30	0005	0995	
0995	16	8002	1204	
1204	35	0005	0559	
1288	60	1142	1699	
1699	11	1480	1585	
1585	44	1039	0991	
1039	10	8001	1147	
1147	10	1194	1156	
1156	21	1142	1695	
1695	60	0559	1364	
1364	10	1194	1771	
1771	21	0559	1142	
0991	60	1755	0459	
0459	10	1662	0867	
0867	15	8003	0575	
0575	15	1378	1583	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1583	20	1037	0791	
0791	16	8002	8003	
0891	10	1194	~~1799~~ 1199	
~~1799~~ 1199	11	1037	0691	From 0459 Page 10 (Constant 1662)
0691	44	0877	1396	
0877	10	8001	8003	From 0877 Page 15
1396	65	0999	1554	
1554	10	1755	0359	
0359	10	1762	8003	
1472	60	1026	0282	From 1472 Page 4
0282	44	1694	0194	
1694	20	1026	0680	
0680	60	1787	0044	
0044	44	1779	0194	
1779	65	1882	0393	
0393	16	0962	0468	
0468	46	0472	0471	
0471	69	1882	0378	
0378	24	0481	0384	
0472	21	0481	0384	
0384	21	0962	0365	
0365	69	0368	0371	
0371	24	1755	0458	
0458	65	0462	0268	
0268	15	1882	0175	
0175	20	0462	1102	To 1102 Page 5
0194	60	0397	1205	
1205	44	0961	0862	To 0961 Page 13
0862	60	0765	0171	
0171	44	0075	0076	
0075	20	0765	0474	
0474	60	1687	1140	
1140	44	1461	0076	
0076	60	0679	0683	
0683	44	0093	0094	
0093	20	0679	0244	
0244	60	1587	0344	
0344	44	0382	0094	
0382	65	1144	0399	
0399	16	0362	0272	
0272	46	0678	0376	
0678	21	0481	0184	
0376	69	1882	0494	
0494	24	0481	0184	
0184	21	0362	0772	
0094	60	0197	1851	
1851	44	0256	0257	
0256	20	0197	0444	
0444	60	1487	0544	
0544	44	0349	0257	
0257	60	0361	0265	
0265	44	0071	0897	
0071	20	0361	1458	
0897	60	0783	0694	
0694	44	0545	0249	
0545	20	0783	1130	
1130	01	1997	1545	To 1545 Page 1
1945	01	9999	1545	To 1545 Page 1
0249	60	1852	0657	
0657	44	0582	1219	To 1219 Page 2
0582	20	1852	1747	
1747	01	1996	1545	To 1545 Page 1
0772	69	0576	0062	
0349	69	0856	0062	
0062	24	1755	1102	To 1102 Page 5
1458	69	0779	0566	
0566	24	1755	1035	To 1035 Page 6
1461	69	1464	0467	
0467	24	0770	1273	
1273	69	1376	1479	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1479	24	1232	1685	
1685	69	1188	0591	
0591	24	1294	0248	
0248	65	1232	1250	
1250	69	1764	0271	
0271	22	0977	8001	
1478	45	0770	1294	0770 From 0467 Page 11
1207	60	0770	0475	
0475	10	1561	1683	
1683	15	8001	0491	
0491	21	0770	1373	
1373	11	8003	1681	
1681	10	8002	0191	
0191	10	1232	1785	
1785	15	1294	1299	
1299	21	1232	1885	
1885	20	1294	1497	
1497	11	1200	1056	
1056	44	0248	1160	
1160	65	1158	1214	
1214	30	0001	1871	
1871	35	0004	1476	
1476	15	1783	0291	
0291	20	0895	1498	From 0291 Page 13
1498	20	1077	1230	
1230	65	1208	0872	
0872	35	0002	1862	
1862	16	0969	0782	
0782	45	1845	1451	
1451	15	8001	1745	
1845	65	8001	0259	
0259	15	1208	1745	
1745	15	1454	0367	
0367	20	1078	1781	
1781	60	0152	1157	
1157	11	1222	1346	
1346	44	1446	1546	
1446	10	1222	1546	
1546	35	0005	1646	
1646	21	1746	1664	
1664	60	0252	1846	
1846	11	1222	1946	
1946	44	1947	1847	
1947	10	1222	1847	
1847	10	1746	1857	
1857	21	1079	1582	
1582	60	0985	0391	
0391	15	8001	0899	
0899	10	1781	0885	
0885	15	1664	0669	
0669	21	1781	1384	
1384	20	1664	0267	
0267	11	8003	0375	
0375	10	1857	1361	
1361	10	1194	0569	
0569	21	1857	1260	
1260	11	1864	0469	
0469	44	1781	1174	
1174	16	1577	1881	
1881	45	0084	0685	To 0685 Page 13
0084	15	8001	1092	
1092	10	1781	0785	
0785	11	1138	1243	
1243	16	8001	1551	
1551	21	1781	1234	
1234	20	1664	0167	
0167	69	0670	1023	
1023	24	1857	1060	
1060	71	1077	1593	
1593	65	0895	1549	

NASN FIXED PROGRAM **PAGE 13 of 15 PAGES**

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1549	15	1783	0291	To 0291 Page 12
0685	69	0670	1673	From 0685 Page 12
1673	24	1857	0960	
0960	69	0964	0067	
0067	24	1781	1484	
1484	69	1038	1242	
1242	24	1664	1768	
1768	71	1077	0369	
0369	65	1222	1677	
1677	10	1030	8003	
1258	10	1561	1015	
1015	11	0968	1773	
1773	44	0877	1578	To 0877 Page 11
1578	60	0981	8003	
1654	10	1561	1865	
1865	11	1868	1873	
1873	44	0877	1028	To 0877 Page 11
1028	60	0881	8003	
1256	10	1561	0965	
0965	11	0868	0973	
0973	44	0877	1678	
1678	60	0781	8003	
1456	10	1561	0865	
0865	11	0768	0873	
0873	44	0877	1878	
1878	65	1882	1794	
1794	16	0462	1772	
1772	46	0278	1676	
1676	69	1882	0193	
0193	24	0147	0372	
0278	21	0147	0372	
0372	65	0362	0168	
0168	15	1882	0181	
0181	20	0362	0666	
0666	65	0571	0776	
0776	20	0581	8002	
0692	44	0595	0961	
0595	16	0571	0676	
0676	20	1755	0858	
0858	69	0665	0671	
0671	24	0397	0695	To 0695 Page 6
0961	65	0581	1594	From 0961 Page 11
1594	15	1561	1751	
1751	16	1854	0061	
0061	45	0766	0572	
0766	15	8001	0776	
0572	20	0397	0247	
0247	20	0147	0347	
0347	65	1882	0447	
0447	16	0462	0547	
0547	46	0647	0747	
0647	21	0481	0284	
0747	69	1882	0847	
0847	24	0481	0284	
0284	21	0462	0950	
0950	69	1756	0062	
0062	24	1755	1102	To 1102 Page 5

NASH FIXED PROGRAM **PAGE 14 of 16 PAGES**

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
0065	20	1900	1399	Constants
0081	84	1900	1025	
0086	99	9999	9999	
0091	20	1900	1003	
0155	00	0009	9999	
0164	11	0086	0592	
0165	00	0000	0009	
0166	00	0000	0000	
0186	99	9999	9999	
0255	00	0009	9999	
0286	99	9999	9999	
0355	00	0009	9999	
0364	11	0089	0993	
0386	99	9999	9999	
0455	00	0009	9999	
0486	99	9999	9999	
0555	00	0009	9999	
0564	65	0088	1652	
0571	10	0087	0692	
0573	60	0086	0292	
0586	99	9999	9999	
0655	00	0009	9999	
0665	00	0000	0001	
0670	21	1079	1582	
0673	60	0089	0693	
0681	10	0089	8002	
0686	99	9999	9999	
0755	00	0009	9999	
0762	00	0000	1349	
0764	15	0087	1496	
0768	20	1353	1456	
0773	60	0088	0893	
0779	00	1300	0000	
0780	24	0086	1102	
0781	20	0153	1456	
0786	99	9999	9999	
0792	24	0086	0695	
0795	24	0089	0892	
0855	00	0009	9999	
0856	00	1400	0000	
0864	00	0100	0000	
0868	20	1352	1256	
0880	24	0089	0192	
0881	20	0152	1256	
0886	99	9999	9999	
0955	00	0009	9999	
0964	60	0152	1157	
0968	20	1355	1258	
0969	00	0000	9900	
0979	00	0000	9900	
0980	10	0086	8002	
0981	20	0151	1654	
0986	99	9999	9999	
0998	00	0018	0000	
0999	99	9999	9999	
1011	65	0001	1002	
1016	21	0051	1109	
1020	60	0053	1457	
1027	00	0000	9900	
1030	20	0155	1258	
1038	60	0252	1846	
1055	00	0009	9999	
1071	65	0000	1070	
1076	21	0053	1867	
1087	84	0000	1226	
1093	65	0000	1240	
1096	64	0000	1182	
1122	00	0100	0000	
1126	10	0000	0000	

NASN FIXED PROGRAM

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1128	20	0000	1150	Constants
1144	00	0000	0001	
1155	00	0009	9999	
1168	65	0000	1036	
1170	84	1800	1025	
1172	20	0090	1202	
1178	21	0055	1574	
1183	84	1300	1025	
1188	20	0154	1207	
1200	64	1352	1294	
1220	60	0051	1455	
1222	00	0009	9999	
1228	65	0000	1262	
1229	20	0000	~~1199~~ 1999	
1238	20	0087	1292	
1255	00	0009	9999	
1270	60	0052	1007	
1271	65	1900	1099	
1362	60	0086	1691	
1372	60	0087	1592	
1376	64	0152	1294	
1386	99	9999	9999	
1392	20	0088	1492	
1398	21	0000	1288	
1462	10	0090	1245	
1464	65	0151	1232	
1468	21	0052	1655	
1482	60	0000	1289	
1486	99	9999	9999	
1562	60	0089	1493	
1566	16	0000	1349	
1577	60	1455	1846	
1580	15	0087	1192	
1586	99	9999	9999	
1650	00	0000	0012	
1662	20	0087	0891	
1679	00	0000	9900	
1680	15	0088	1793	
1686	99	9999	9999	
1749	00	0000	9900	
1762	20	0086	1472	
1764	65	0000	1478	
1770	60	0055	1209	
1780	21	0087	1792	
1783	00	0000	0011	
1786	99	9999	9999	
1854	10	1087	0692	
1864	21	1085	1582	
1868	20	1351	1654	
1880	21	0088	0793	
1882	00	0000	0001	
1886	99	9999	9999	
1950	00	0000	0000	
1979	00	0600	0000	
1994	65	0087	1241	

PAGE 1 of 4 PAGES

NASH SEVEN INSTRUCTIONS PER CARD LOAD ROUTINE

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7000519999 6919021901 6919041903 6919061905   6919081907 7019159999 6919061908 2419191919
6919020052 2419150053 6919030054 2419160055   6919040056 2419170057 6919050058 2419181907
2419381916 7019449999 2419441917 6519011929   2419291918 6919321936 2419361919 2219321939
2419391916 3500041931 2419311917 1580011940   2419401918 2219281934 2419341919 6519411942
2419421916 1019328002 2419271917 1019301935   2419351918 1580011943 2419431919 1119321933
2419331916 4419371938 2419371917 1080018002   2419321919 2400001927 2419411919 6919028003
2419301938 0000010000 0000000000 0000000000   0000000000 0000000000 0000000000 0000000000
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NASH FIXED PROGRAM - SEVEN INSTRUCTIONS PER CARD

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0000510007 0000000000 0000000000 0000000000   0000000000 0000000000 0000000000 0000000000
0000580007 0000000000 0000000000 0000000000   4507660572 2417551102 1615960658 6500770684
0000650007 2019001399 3000010273 2417811484   2012851298 1111080448 1600510456 2003611458
0000720007 4407501095 4411000179 6000510069   2007650474 6006790683 0000000000 1013811085
0000790007 0000000000 0000090000 8419001025   6017551059 6018961201 1580011092 2103928002
0000860007 9999999999 0000000000 0000000000   0000000000 0000000000 2019001003 2112468002
0000930007 2006790244 6001971851 0000000000   6511220644 4409960396 0000000000 6011060465
0001440007 0000000000 6500520245 2109690246   0000000000 1916601215 6000511105 0000000000
0001510007 0000000000 0000000000 0000000000   0000000000 0000099999 1101650073 2411591567
0001580007 2011080098 1080020668 1501641752   6000510357 4409560771 2412081064 1100860593
0001650007 0000000009 0000000000 6906701023   1518820181 1530030677 1505730177 4400750076
0001720007 6000510457 2100791782 1680020195   2004621102 4417951472 1007800092 6518821146
0001790007 2418521100 0000000000 2003620666   2117960599 3000040894 2103620772 2104928002
0001860007 9999999999 0000000000 0000000000   0000000000 0000000000 1012321785 6519500261
0001930007 2401470372 6003971205 3500070162   1515911296 0000000000 2104761980 3500040258
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0002580007 2111080262 1512081745 1108640470   1100510358 6000510656 3000011274 6517550160
0002650007 4400710897 1118761584 1180030375   1518820175 1580030777 1506730277 2209778001
0002720007 4606780376 1680020381 6509791383   2011081218 1180030983 1008800085 2101470372
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0003580007 3500030072 1017628003 1503641754   0000000000 0000000000 3000011471 1100890993
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0003790007 1580010845 0000000000 3500070296   6511440399 1111440949 2109620365 1507920997
0003860007 9999999999 0000000000 0000000000   0000000000 0000000000 1580010899 0000000000
0003930007 1609620469 0000000000 1615961359   6511580496 0000000000 ~~0000000000~~a. 1603620372
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0004580007 6504620268 1016620867 1108640570   1506651648 0000000000 2110181371 6517550360
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0004720007 2104810384 4504780480 6016871140   1015611683 0000000000 1017800285 6011080066
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0004860007 9999999999 0000000000 0000000000   0000000000 0000000000 2107701373 0000000000
0004930007 4611021246 2404810184 0000000000   3000060596 3000040597 6012081953 2111080871
0005440007 4403490257 2007831130 3500021951   4606470747 6517491012 2009791048 0000000000
0005510007 0000000000 0000000000 0000000000   0000000000 0000099999 3500011473 3500030673
0005580007 1680021452 0000000000 1005648003   6519500159 1011220778 4615740667 6500881652
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a, 3500020699

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0005790007 1018820594 0000000000 0000000000 2018521747 1680021395 6509691973 1512381693
0005860007 9999999999 0000000000 0000000000 0000000000 0000000000 2412940248 4606951861
0005930007 4603920192 3000030158 1605710676 3500090696 3500070797 3000021139 1180030757
0006440007 2012130744 1680010578 4415520746 2104810284 6500511163 6512080063 1501800450
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0006580007 4601631064 1080020967 1108640169 1080020370 4401781100 6915661369 6017550560
0006650007 0000000001 6505710776 6080011375 1513720477 2117811384 2110791582 2403970695
0006720007 1180030579 6000890693 6516791483 2114801033 2017550858 1016800485 2104810184
0006790007 0000000000 6017870044 1000898002 6907621569 4400930094 1515960959 6906701673
0006860007 9999999999 0000000000 0000000000 0000000000 0000000000 4408771396 4405950961
0006930007 1118890593 4405450249 6004810293 1509790796 3500020848 1103741044 1180031107
0007440007 2111140844 6517551991 6017490846 6918820847 6910000898 6514541659 6011080562
0007510007 0000000000 0000000000 0000000000 0000000000 0000099999 3500030971 3500011763
0007580007 4610140064 1514628002 1007648003 1080020270 0000001349 4616661867 1500571490
0007650007 0000000000 1580010776 1517708002 2013531456 4602740875 0000000000 2006791095
0007720007 6905760062 6000880893 6510270281 2409690774 2005818002 1015800585 2111080261
0007790007 0013000000 2400861102 2001531456 4518451451 0000000000 2004950498 1111381243
0007860007 9999999999 0000000000 0000000000 0000000000 0000000000 1680028003 2400860695
0007930007 6519500761 2403611100 2400890892 1500770896 1510271097 2014481466 2117541257
0008440007 6500510557 1001660945 2110270946 2404810284 2111121065 6517490549 1519760450
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0008580007 6906650671 1515628002 1108640269 1080020170 6007650171 0000000000 0001000000
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0008720007 3500021862 4408771870 4419821101 2410270274 6918820994 1080018003 2101971095
0008790007 6000511133 2400890192 2001521256 2400770884 1001801136 6515910395 1516640669
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0008930007 1018880492 2101660276 0000000000 2010770849 6007830694 2400481998 1017810885
0009440007 0000000000 3500041995 2004761552 0119921567 2112081980 4416571658 5917560062
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0009580007 1117961559 4608820884 6909640067 6505811594 0000000000 1510161021 6001521157
0009650007 1108680973 2106790099 1008700675 2013551258 0000009900 4606740976 4411750875
0009720007 6918821445 4408771678 2012790082 2013811134 2409790674 0000000000 2104810484
0009790007 0000009900 1000868002 2001511654 3500030348 3500021394 2000950298 0002000000
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0009930007 4617610892 2401970750 1680021204 6516790196 2117521656 0018000000 9999999999
0010000007 0000000000 2110821235 0000000000 6013521357 2005591142 3500011161 1510118002
0010070007 1018821465 3000031571 0000000000 1510881068 6500011002 2009690948 4610661067
0010140007 2404760064 1109681773 2100511109 1512208002 0000000000 6910871184 6000531457
0010210007 1512138002 1100481555 2418571060 2010270198 6911281131 0000000000 0000009900
0010280007 6008818003 6511081123 2001551253 3500010295 6511581062 1180031791 1011241261
0010350007 6517551061 1511441128 0000000000 6002521846 1080011147 6517551010 1111441049
0010420007 6015680049 6515960546 4415670749 2102501954 1609691989 6517491024 2100771980
0010490007 4417591560 6511080280 0000000000 0000000000 0000000000 0000000000 0000099999
0010560007 4402481160 1015611965 6009621769 1109981653 7110771593 1080021669 3000011869
0010630007 2118881091 6504761284 6509691224 2418891067 6018861193 1510718002 3500021129
0010700007 2018591164 6500001070 0000000000 6914481162 6511580497 4411791180 2100531867
0010770007 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000 0000000000
0010840007 0000000000 1180021697 8800000000 8400001226 0000870000 1680020697 6510931195
0010910007 6018891203 1017810785 6500001240 3500011494 6911141872 5400001182 1504760449
0010980007 6700521094 2011041072 6511080461 6018871191 6017550860 4615471110 0000000000
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0011190007 1011221227 2111241181 2111081211 0001000000 1511261231 0000000000 2013561145
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0011750007  3500011999  1180031983  2012131166  2100551574  1000811186  6911831187  1180011598
0011820007  0000000000  8413001025  2210871090  4411391127  2111621466  2411621165  2001541207
0011890007  2010001797  6018881143  1011441149  0000000000  1110091863  0000010000  2111141275
0011960007  3500051453  1018911495  6914481087  ~~6512131017~~ a  6413521294  3500051272  6517551210
0012030007  1110091013  3500050559  4409610862  6010090266  6007700475  0000000000  1110090563
0012100007  1080011367  1500511355  0000000000  0001000000  3000011871  6410180078  0010000000
0012170007  2418861548  6013661221  6911221225  6000511455  4411251195  0000099999  1510761021
0012240007  1611120869  2412131266  6912291132  1112161185  6500001262  2000001199  6512080872
0012310007  2011081111  0000000000  1080011291  2016640167  6018981853  6700521765  2111421595
0012380007  2000871292  6018941499  1511441229  1514541159  2416641768  1680011551  2000481798
0012450007  2110841287  0000000000  6017550760  2015531360  2210021006  6917640271  0000000000
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0012660007  6511081463  1111701075  8419001248  1516751280  6000521007  6519001099  1018971001
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0013510007  2011921247  0000000000  1080011460  6900911775  1180030565  1611940663  1011941363
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0013790007  1014821237  2416791579  0000000000  6018921297  1611120970  2016640267  2114521358
0013860007  9999999999  0000000000  0000000000  0000000000  0000000000  3100011196  2000881493
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0014440007  4515670749  2407830794  1012221546  4400461035  0000000000  2110810083  4403450074
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0014650007  1514681021  6511681073  1512708002  2100521655  3500050975  1080011277  2001800583
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0014790007  2412321685  0000000000  6511580263  6000001239  1611121870  6910381242  1510881293
0014860007  9999999999  0000000000  0000000000  0000000000  0000000000  2115960649  6017550460
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0015580007  6509620568  4415671459  6017960049  0001000000  6000891493  0000000000  6015631348
0015650007  2115701573  1600001349  7000980098  0000000000  2410721553  0000000000  2103800883
0015720007  3500010698  1180031031  6900510157  4403831884  3000020645  6014551846  6009818003
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a. 1110370691

b. 0000000000

```
0017790007 6518820393 2100871792 6001521157   6700520857 0000000011 2415911043 1512941299
0017860007 9999999999 0000000000 0000000000   0000000000 0000000000 1080021379 6519500661
0017930007 4416471661 1604621772 6909981651   0000000000 6000500956 6918821879 ~~1110370691~~ 9
0018440007 3500081644 6580010259 1112221946   1017461857 6080011948 2416791949 4615670398
0018510007 4402560257 0000000000 3500051276   1010870692 2016600463 1180031665 2110791582
0018580007 4409581459 0000000000 1011941264   0000000000 1609690782 4615481217 2110851582
0018650007 1118681873 6005501858 1512130767   2013511654 1512791283 4615791380 3500041476
0018720007 2419501996 4408771028 3500010182   6911151268 0000000000 2012121391 6518821794
0018790007 2410261098 2100880793 4500840685   0000000001 1103560662 6700521557 2012941497
0018860007 9999999999 0000000000 0000000000   0000000000 0000000000 0000000000 0000000000
0018930007 0000000000 0000000000 0000000000   0000000000 0000000000 0000000000 0000000000
0019450007 0199991545 4419471847 1012221847   1108631850 2115911980 0000000000 1503800650
0019520007 2111081148 3000011961 6519661977   6002501957 6580011978 1119761981 2010770548
0019590007 1112161971 3000041972 2119661176   4419671074 3000011970 3000011990 4419681969
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0019730007 3000030784 6511581963 1119791988   0000000000 1604950299 3500031987 0006000000
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0019870007 1500950850 4419921993 1512081958   3500041046 1519948002 1015611962 6511581964
0019940006 6500871241 2110770745 6018870176   0000000000 2110260879 4400990876 0000100000
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a.6512131017

NASN FIXED PROGRAM 650 DRUM UTILIZATION

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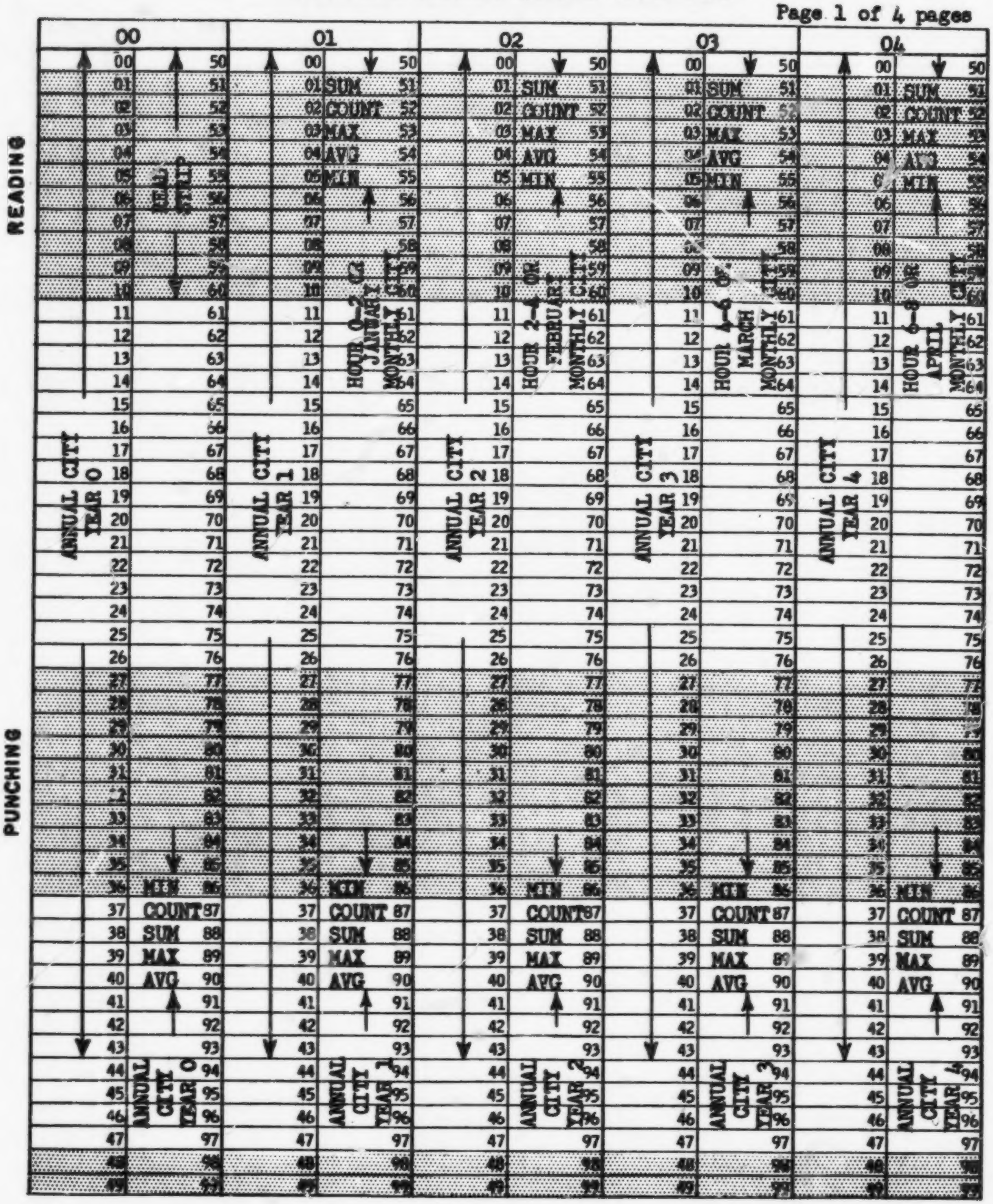

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READING	00	ANNUAL CITY YEAR 0	READ FIELD	ANNUAL CITY YEAR 1		ANNUAL CITY YEAR 2		ANNUAL CITY YEAR 3		ANNUAL CITY YEAR 4		50
	01				SUM		SUM		SUM		SUM	51
	02				COUNT		COUNT		COUNT		COUNT	52
	03				MAX		MAX		MAX		MAX	53
	04				AVG		AVG		AVG		AVG	54
	05				MIN		MIN		MIN		MIN	55
	06											56
	07											57
	08				HOUR 0-2 OR JANUARY MONTHLY CITY		HOUR 2-4 OR FEBRUARY MONTHLY CITY		HOUR 4-6 OR MARCH MONTHLY CITY		HOUR 6-8 OR APRIL MONTHLY CITY	58
	09											59
	10											60
	11											61
	12											62
	13											63
	14											64
	15											65
	16											66
	17											67
	18											68
	19											69
	20											70
	21											71
	22											72
	23											73
	24											74
	25											75
	26											76
PUNCHING	27											77
	28											78
	29											79
	30											80
	31											81
	32											82
	33											83
	34											84
	35											85
	36		MIN		MIN		MIN		MIN		MIN	86
	37		COUNT		COUNT		COUNT		COUNT		COUNT	87
	38		SUM		SUM		SUM		SUM		SUM	88
	39		MAX		MAX		MAX		MAX		MAX	89
	40		AVG		AVG		AVG		AVG		AVG	90
	41											91
	42											92
	43											93
	44		ANNUAL CITY YEAR 0		ANNUAL CITY YEAR 1		ANNUAL CITY YEAR 2		ANNUAL CITY YEAR 3		ANNUAL CITY YEAR 4	94
	45											95
	46											96
	47											97
	48											98
	49											99

NASN FIXED PROGRAM 650 DRUM UTILIZATION

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		05		06		07		08		09		
	00	↑	↓	↑	↓	↑	↓	↑	↓	↑	↓	50
READING	01		SUM		SUM		SUM		SUM		SUM	51
	02		COUNT		COUNT		COUNT		COUNT		COUNT	52
	03		MAX		MAX		MAX		MAX		MAX	53
	04		AVG		AVG		AVG		AVG		AVG	54
	05		MIN		MIN		MIN		MIN		MIN	55
	06		↑		↑		↑		↑		↑	56
	07											57
	08		HOUR 8-10 OR MAY MONTHLY CITY		HOUR 10-12 OR JUNE MONTHLY CITY		HOUR 12-14 OR JULY MONTHLY CITY		HOUR 14-16 OR AUGUST MONTHLY CITY		HOUR 16-18 OR SEPTEMBER MONTHLY CITY	58
	09											59
	10											60
	11											61
	12											62
	13											63
	14											64
	15											65
	16	ANNUAL CITY YEAR 5		ANNUAL CITY YEAR 6		ANNUAL CITY YEAR 7		ANNUAL CITY YEAR 8		ANNUAL CITY YEAR 9		66
	17											67
	18											68
	19											69
	20											70
	21											71
	22											72
	23											73
	24											74
	25											75
	26											76
PUNCHING	27											77
	28											78
	29											79
	30											80
	31											81
	32											82
	33											83
	34											84
	35		↓		↓		↓		↓		↓	85
	36		MIN		MIN		MIN		MIN		MIN	86
	37		COUNT		COUNT		COUNT		COUNT		COUNT	87
	38		SUM		SUM		SUM		SUM		SUM	88
	39		MAX		MAX		MAX		MAX		MAX	89
	40		AVG		AVG		AVG		AVG		AVG	90
	41		↑		↑		↑		↑		↑	91
	42											92
	43	↓		↓		↓		↓		↓		93
	44		ANNUAL CITY YEAR 5		ANNUAL CITY YEAR 6		ANNUAL CITY YEAR 7		ANNUAL CITY YEAR 8		ANNUAL CITY YEAR 9	94
	45											95
	46											96
	47											97
	48											98
	49											99

NASN FIXED PROGRAM 650 DRUM UTILIZATION

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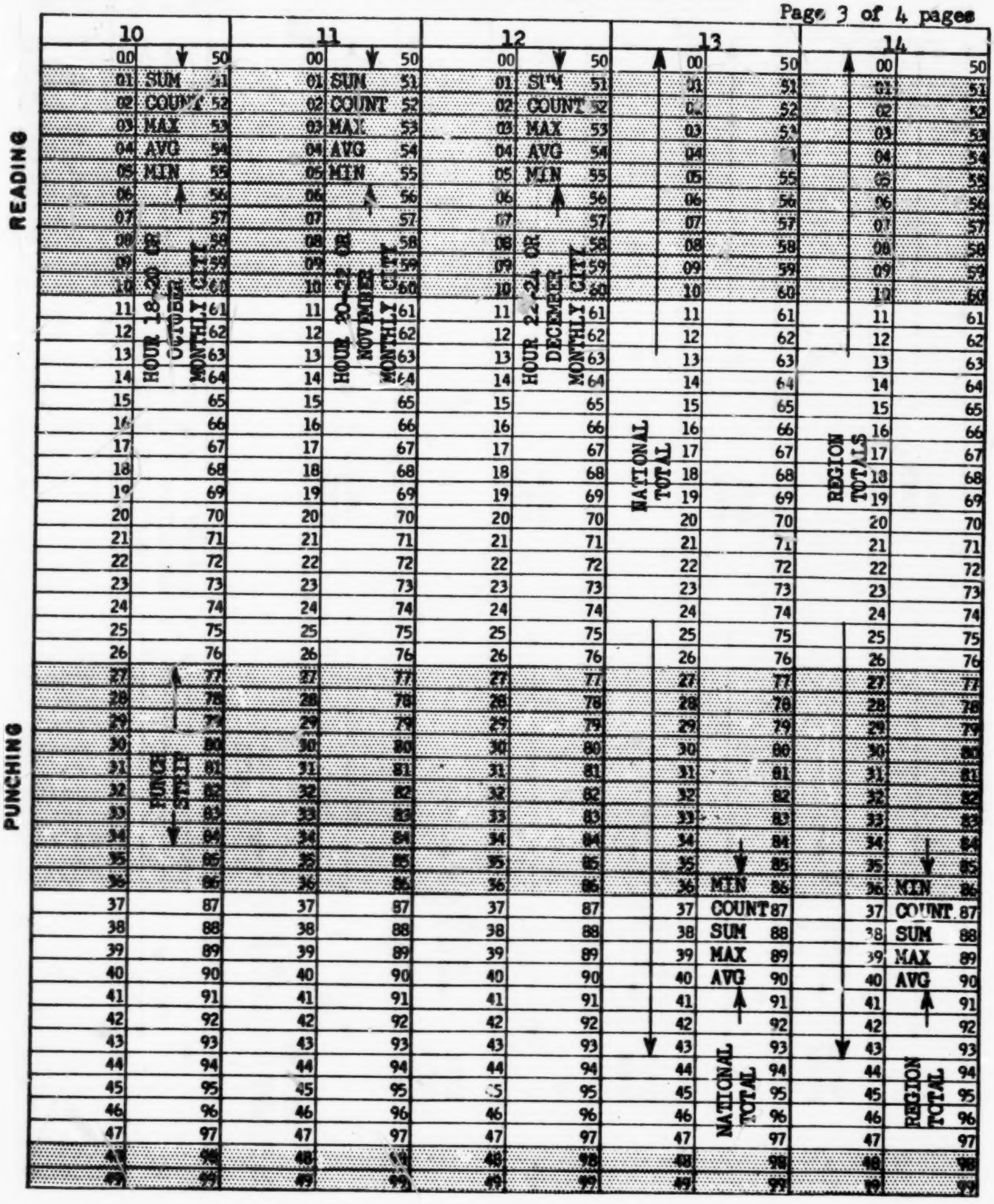

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	03	MAX	53	03	MAX	53	03	MAX	53	03		53	03		53
	04	AVG	54	04	AVG	54	04	AVG	54	04		54	04		54
	05	MIN	55	05	MIN	55	05	MIN	55	05		55	05		55
	06		56	06		56	06		56	06		56	06		56
	07		57	07		57	07		57	07		57	07		57
	08	HOUR 18-20 OR OCTOBER MONTHLY CITY	58	08	HOUR 20-22 OR NOVEMBER MONTHLY CITY	58	08	HOUR 22-24 OR DECEMBER MONTHLY CITY	58	08		58	08		58
	09		59	09		59	09		59	09		59	09		59
	10		60	10		60	10		60	10		60	10		60
	11		61	11		61	11		61	11		61	11		61
	12		62	12		62	12		62	12		62	12		62
	13		63	13		63	13		63	13		63	13		63
	14		64	14		64	14		64	14		64	14		64
	15		65	15		65	15		65	15		65	15		65
	16		66	16		66	16		66	16	NATIONAL TOTAL	66	16	REGION TOTALS	66
	17		67	17		67	17		67	17		67	17		67
	18		68	18		68	18		68	18		68	18		68
	19		69	19		69	19		69	19		69	19		69
	20		70	20		70	20		70	20		70	20		70
	21		71	21		71	21		71	21		71	21		71
	22		72	22		72	22		72	22		72	22		72
	23		73	23		73	23		73	23		73	23		73
	24		74	24		74	24		74	24		74	24		74
	25		75	25		75	25		75	25		75	25		75
	26		76	26		76	26		76	26		76	26		76
PUNCHING	27		77	27		77	27		77	27		77	27		77
	28		78	28		78	28		78	28		78	28		78
	29		79	29		79	29		79	29		79	29		79
	30	PUNCH STRIP	80	30		80	30		80	30		80	30		80
	31		81	31		81	31		81	31		81	31		81
	32		82	32		82	32		82	32		82	32		82
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	36		86	36		86	36		86	36	MIN	86	36	MIN	86
	37		87	37		87	37		87	37	COUNT	87	37	COUNT	87
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	39		89	39		89	39		89	39	MAX	89	39	MAX	89
	40		90	40		90	40		90	40	AVG	90	40	AVG	90
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	42		92	42		92	42		92	42		92	42		92
	43		93	43		93	43		93	43		93	43		93
	44		94	44		94	44		94	44	NATIONAL TOTAL	94	44	REGION TOTAL	94
	45		95	45		95	45		95	45		95	45		95
	46		96	46		96	46		96	46		96	46		96
	47		97	47		97	47		97	47		97	47		97
	48		98	48		98	48		98	48		98	48		98
	49		99	49		99	49		99	49		99	49		99

NASN FIXED PROGRAM 650 DRUM UTILIZATION

Page 4 of 4 pages

		15	15	16	16	17	17	18	18	19	
READING	00	↑		↑		↑		↑		↑ ↑ ↑	50
	01										51
	02										52
	03										53
	04										54
	05										55
	06										56
	07										57
	08										58
	09										59
	10										60
	11										61
	12										62
	13										63
	14										64
	15										65
	16										66
	17										67
	18	TOTAL STATE		CITY TOTAL		SITE TOTAL		ANNUAL SITE		7 INSTRUCTION LOAD ROUTINE 7 INSTRUCTION PUNCH ROUTINE CUMULATIVE FREQ. DIST.	68
	19										69
	20										70
	21										71
	22										72
	23										73
	24										74
	25										75
	26										76
PUNCHING	27										77
	28										78
	29										79
	30								ANNUAL SITE		80
	31										81
	32										82
	33										83
	34										84
	35		↓		↓		↓		↓		85
	36		MIN		MIN		MIN		MIN		86
	37		COUNT		COUNT		COUNT		COUNT		87
	38		SUM		SUM		SUM		SUM		88
	39		MAX		MAX		MAX		MAX		89
	40		AVG		AVG		AVG		AVG		90
	41		↑		↑		↑		10		91
	42								20	↓	92
	43	↓		↓		↓		↓	30	↓	93
	44		TOTAL STATE		CITY TOTAL		SITE TOTAL	DECILES	40	↓	94
	45								50		95
	46								60		96
	47								70		97
	48								80		98
	49								90		99

APPENDIX H

Alphabetic Identification

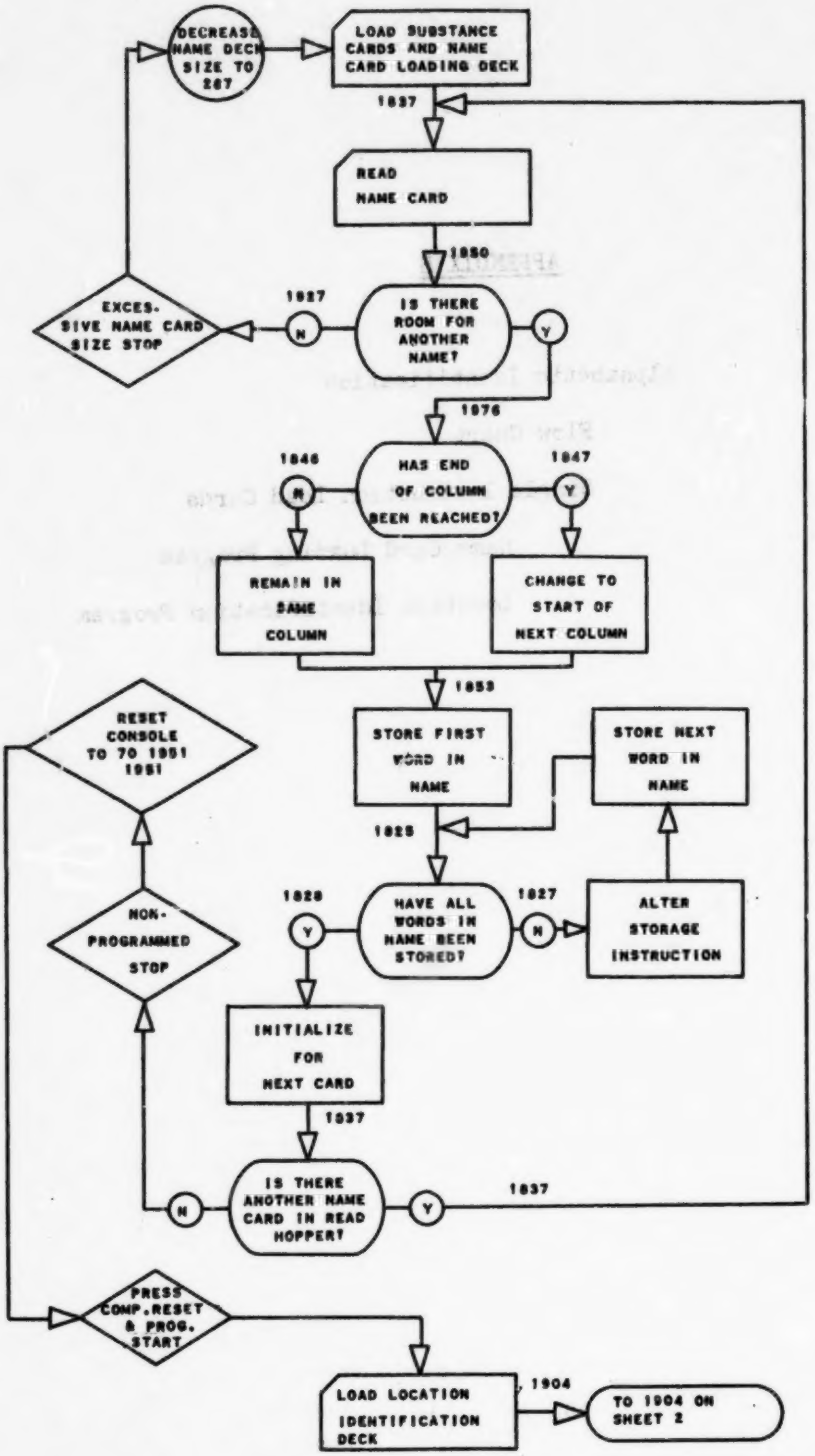
Flow Chart

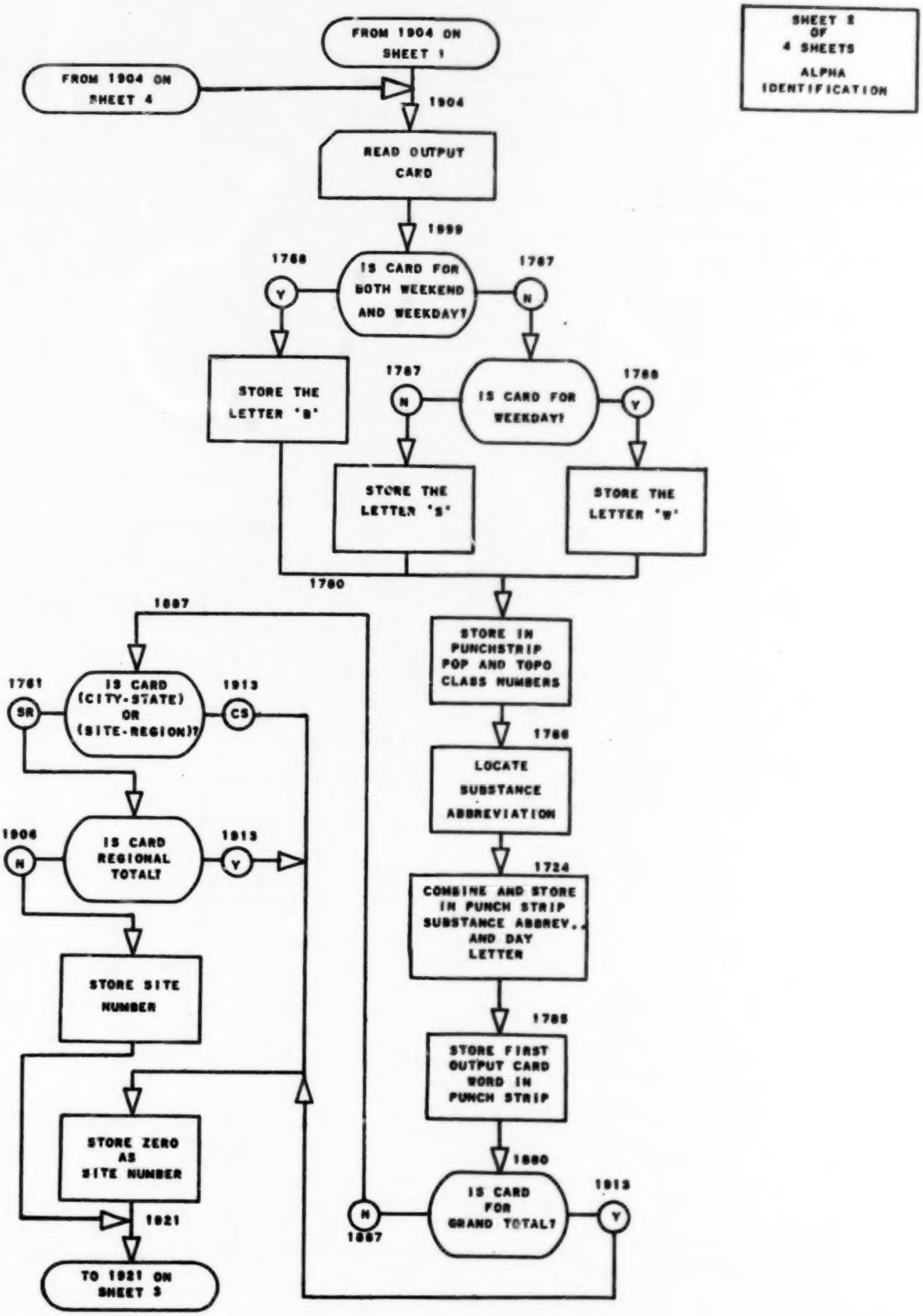
Single Instruction Load Cards

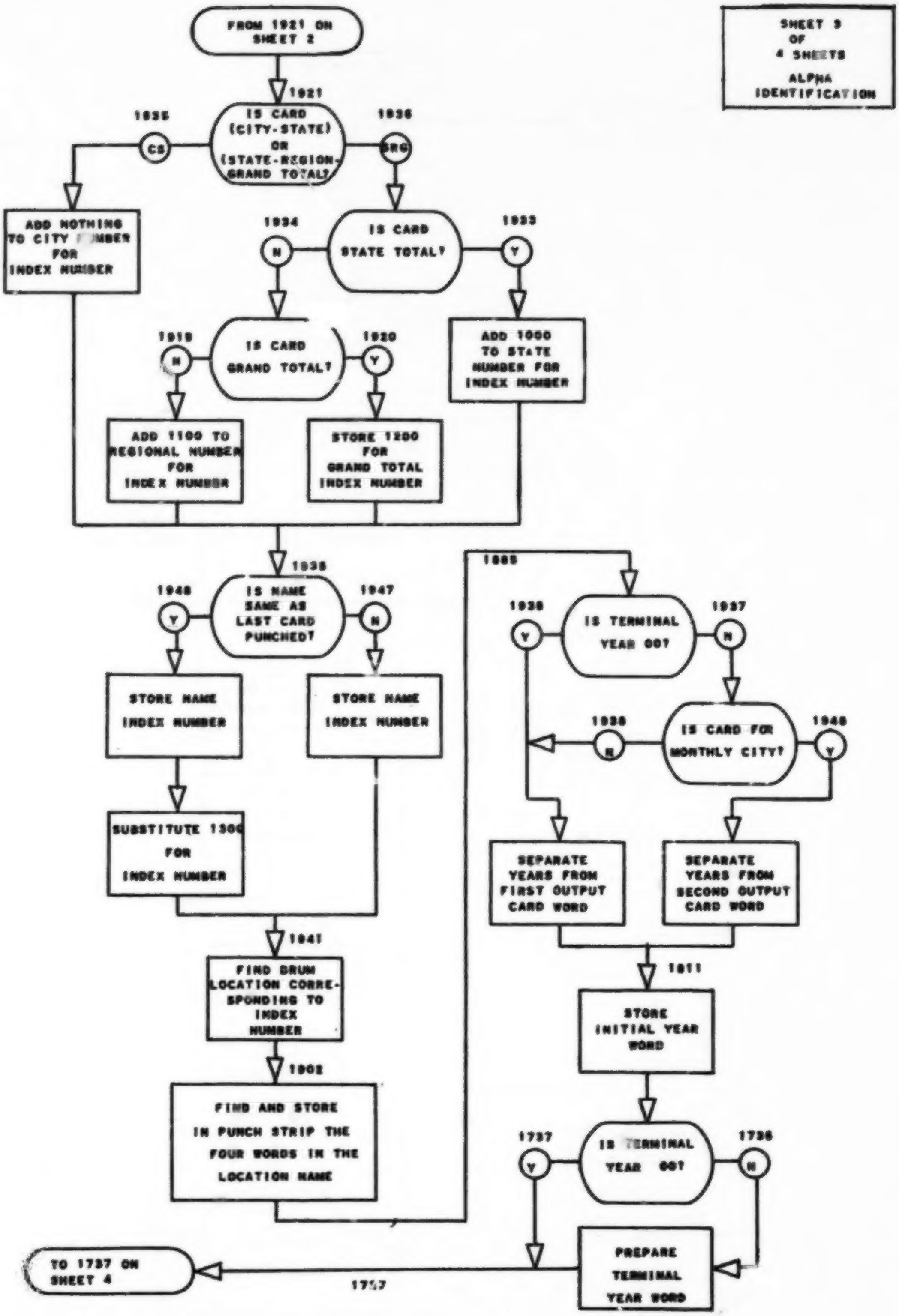
Name Card Loading Program

Location Identification Program

SHEET 1
OF
4 SHEETS
ALPHABETIC IDENTIFICATION CARD PREPARATION PROGRAM

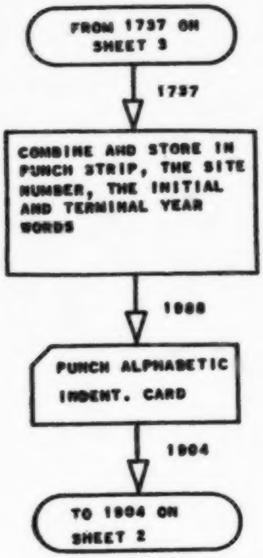

DECREASE NAME DECK SIZE TO 287
LOAD SUBSTANCE CARDS AND NAME CARD LOADING DECK
1837
READ NAME CARD
1880
1927
EXCESSIVE NAME CARD SIZE STOP
N
IS THERE ROOM FOR ANOTHER NAME?
Y
1876
1846
N
HAS END OF COLUMN BEEN REACHED?
1847
Y
REMAIN IN SAME COLUMN
CHANGE TO START OF NEXT COLUMN
1853
RESET CONSOLE TO 70 1951 1951
STORE FIRST WORD IN NAME
STORE NEXT WORD IN NAME
1825
1828
Y
HAVE ALL WORDS IN NAME BEEN STORED?
1827
N
ALTER STORAGE INSTRUCTION
NON-PROGRAMMED STOP
INITIALIZE FOR NEXT CARD
1837
N
IS THERE ANOTHER NAME CARD IN READ HOPPER?
Y
1837
PRESS COMP. RESET & PROG. START
LOAD LOCATION IDENTIFICATION DECK
1904
TO 1904 ON SHEET 2


SHEET 2
OF
4 SHEETS
ALPHA
IDENTIFICATION
FROM 1904 ON
SHEET 1
FROM 1904 ON
SHEET 4
1904
READ OUTPUT
CARD
1899
1768
Y
IS CARD FOR
BOTH WEEKEND
AND WEEKDAY?
1767
N
STORE THE
LETTER 'B'
1787
N
IS CARD FOR
WEEKDAY?
1769
Y
STORE THE
LETTER 'S'
STORE THE
LETTER 'W'
1780
STORE IN
PUNCHSTRIP
POP AND TOPO
CLASS NUMBERS
1766
LOCATE
SUBSTANCE
ABBREVIATION
1724
COMBINE AND STORE
IN PUNCH STRIP
SUBSTANCE ABBREV.,
AND DAY
LETTER
1785
STORE FIRST
OUTPUT CARD
WORD IN
PUNCH STRIP
1880
IS CARD
FOR
GRAND TOTAL?
1913
Y
N
1887
1887
1761
SR
IS CARD
(CITY-STATE)
OR
(SITE-REGION)?
1913
CS
1906
N
IS CARD
REGIONAL
TOTAL?
1913
Y
STORE SITE
NUMBER
STORE ZERO
AS
SITE NUMBER
1921
TO 1921 ON
SHEET 3


SHEET 3
OF
4 SHEETS
ALPHA
IDENTIFICATION

FROM 1921 ON SHEET 2
1921
IS CARD (CITY-STATE) OR (STATE-REGION-GRAND TOTAL)?
1935
CS
1936
SRG
ADD NOTHING TO CITY NUMBER FOR INDEX NUMBER
1934
N
IS CARD STATE TOTAL?
1933
Y
1919
N
IS CARD GRAND TOTAL?
1920
Y
ADD 1000 TO STATE NUMBER FOR INDEX NUMBER
ADD 1100 TO REGIONAL NUMBER FOR INDEX NUMBER
STORE 1200 FOR GRAND TOTAL INDEX NUMBER
1938
1948
Y
IS NAME SAME AS LAST CARD PUNCHED?
1947
N
STORE NAME INDEX NUMBER
STORE NAME INDEX NUMBER
SUBSTITUTE 1300 FOR INDEX NUMBER
1941
FIND DRUM LOCATION CORRESPONDING TO INDEX NUMBER
1902
FIND AND STORE IN PUNCH STRIP THE FOUR WORDS IN THE LOCATION NAME
1885
1939
Y
IS TERMINAL YEAR 00?
1937
N
1938
N
IS CARD FOR MONTHLY CITY?
1940
Y
SEPARATE YEARS FROM FIRST OUTPUT CARD WORD
SEPARATE YEARS FROM SECOND OUTPUT CARD WORD
1811
STORE INITIAL YEAR WORD
1737
Y
IS TERMINAL YEAR 00?
1736
N
PREPARE TERMINAL YEAR WORD
TO 1737 ON SHEET 4
1737

SHEET 4
OF
4 SHEETS
ALPHA
IDENTIFCATION


FROM 1737 ON
SHEET 3
1737
COMBINE AND STORE IN PUNCH STRIP, THE SITE NUMBER, THE INITIAL AND TERMINAL YEAR WORDS
1988
PUNCH ALPHABETIC
INDENT. CARD
1904
TO 1904 ON
SHEET 2

NASN NAME CARD LOADING PROGRAM

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1837	70	1951	1950	
1950	65	1903	1907	
1907	15	1910	1915	
1915	16	1969	1973	
1973	45	1976	1927	
1927	01	1899	9000	
1976	15	8001	1833	
1833	16	1836	1841	
1841	45	1846	1847	
1847	15	8001	1805	
1805	15	1908	1963	
1963	20	1836	1839	
1839	16	1842	1853	
1846	15	8001	1853	
1853	10	1806	8003	
1825	10	1910	1865	
1865	11	1818	1823	
1823	44	1827	1828	
1828	16	1831	1738	
1738	20	1903	1837	
1827	10	8001	1745	
1745	15	1830	8003	
1903	23	9999	1825	Constants
1969	24	0297	1825	
1836	24	0048	1825	
1806	69	1951	8002	
1818	69	1956	8002	
1910	00	0001	0000	
1842	00	0048	0000	
1908	00	0050	0000	
1830	00	0300	0000	
0297	99	9999	9999	
1831	00	1200	0000	

NASN LOCATION IDENTIFICATION PROGRAM **PAGE 1 of 3 PAGES**

LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1904	70	1999	1999	
1999	65	1952	1757	
1757	35	0001	1763	
1763	44	1767	1768	
1768	69	1771	1774	
1774	24	1777	1780	
1767	16	8002	1775	
1775	11	1778	1783	
1783	44	1787	1788	
1787	69	1790	1774	
1788	69	1791	1774	
1780	65	1952	1707	
1707	35	0001	1713	
1713	11	8003	1721	
1721	35	0002	1727	
1727	16	8002	1734	
1734	30	0002	1741	
1741	20	1983	1786	
1786	65	1952	1758	
1758	35	0003	1717	
1717	11	8003	1725	
1725	35	0002	1731	
1731	16	8002	1739	
1739	35	0004	1749	
1749	10	1752	8003	
1724	15	1777	1781	
1781	20	1982	1785	
1785	65	1951	1905	
1905	20	1984	1880	
1880	35	0001	1744	
1744	44	1887	1913	
1887	11	8003	1895	
1895	35	0002	1901	
1901	44	1856	1761	
1761	35	0003	1779	
1779	44	1906	1913	
1856	11	8003	1913	
1913	21	1735	1921	
1906	65	1951	1857	
1857	35	0001	1813	
1813	16	8002	1821	
1821	30	0002	1877	
1877	15	1770	1729	
1729	20	1735	1921	
1921	65	1951	1807	
1807	35	0003	1815	
1815	11	8003	1873	
1873	35	0003	1931	
1931	44	1935	1936	
1936	65	1951	1808	
1808	35	0001	1965	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1965	11	8003	1923	
1923	35	0002	1929	
1929	44	1933	1934	
1933	10	1886	1935	
1934	65	1951	1858	
1858	35	0001	1866	
1866	44	1919	1920	
1919	10	1922	1935	
1920	10	1924	1935	
1935	11	1838	1843	
1843	44	1947	1948	
1947	10	8001	1909	
1909	21	1838	1941	
1948	10	8001	1809	
1809	21	1838	1891	
1891	60	1894	1941	
1941	16	8002	1949	
1949	11	8003	1859	
1859	84	0000	1902	
1902	15	1810	1816	
1816	69	1819	1822	
1822	22	1875	1878	
1878	15	1810	1916	
1916	69	1870	1874	
1874	22	1928	1832	
1832	15	1810	1966	
1966	69	1970	1974	
1974	22	1829	1932	
1932	15	1810	1917	
1917	69	1820	1824	
1824	22	1879	1875	
1876	24	1977	1928	
1826	24	1978	1829	
1926	24	1979	1879	
1925	24	1980	1885	
1885	60	1951	1861	
1861	30	0002	1867	
1867	11	8003	1882	
1882	45	1937	1938	
1937	16	1840	1845	
1845	46	1848	1938	
1848	60	1952	1811	
1911	30	0004	1884	
1938	60	1951	1811	
1811	30	0004	1871	
1871	11	8003	1884	
1884	30	0006	1747	
1747	20	1711	1720	
1720	30	0003	1730	
1730	35	0006	1700	

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LOCATION	OPERATION	DATA ADDRESS	INSTRUCTION ADDRESS	REMARKS
1700	20	1705	1708	
1708	60	1711	1715	
1715	30	0002	1722	
1722	16	8002	1732	
1732	30	0001	1789	
1789	11	8003	1797	
1797	35	0005	1709	
1709	10	1705	1759	
1759	10	1762	1718	
1718	21	1772	1776	
1776	60	1711	1765	
1765	30	0002	1773	
1773	11	8003	1782	
1782	45	1736	1737	
1736	35	0001	1743	
1743	16	8002	1751	
1751	35	0002	1760	
1760	21	1764	1769	
1769	60	1711	1766	
1766	30	0001	1723	
1723	11	8003	1733	
1733	35	0001	1740	
1740	10	1764	1719	
1719	10	1726	1737	
1737	10	1772	1728	
1728	10	1735	1742	
1742	21	1981	1988	
1988	71	1977	1904	
1771	62	0000	0000	**CONSTANTS**
1778	00	0000	0001	
1790	82	0000	0000	
1791	86	0000	0000	
1752	65	1600	1724	
1770	90	0000	0000	
1886	00	0000	1000	
1922	00	0000	1100	
1924	00	0000	1200	
1762	00	9090	0000	
1726	00	0000	9090	
1894	00	0000	1300	
1810	00	0300	0000	
1819	69	0000	1876	
1870	69	0000	1826	
1970	69	0000	1926	
1820	69	0000	1925	
1840	45	0000	0000	
1986	88	0000	0000	